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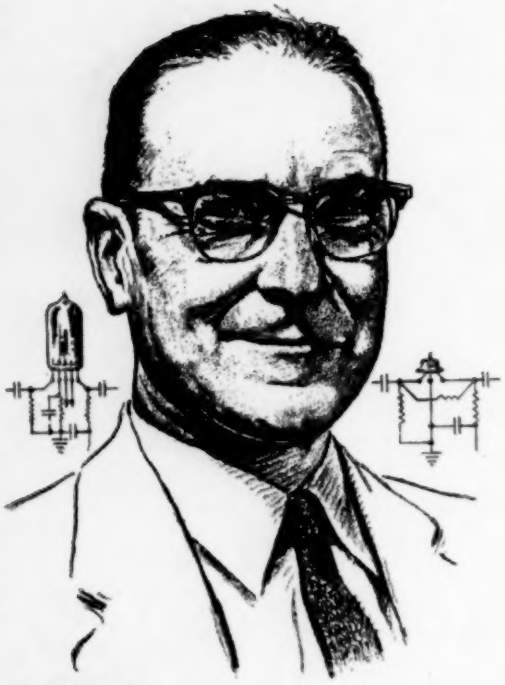
The Chemists Up-Date Textile Fibers



VIGNETTE

ELECTRONICS ENGINEER

R. KENT CROOKS

Through continuing developments in recent years, the field of electronics has had far-reaching effect on many fields of technology. Progress in the field may be expected to continue, observes R. Kent Crooks, of Battelle. He points out that new materials are now under study for use in both active and passive components, and for use in the development of improved transducers for converting energy in various forms both to and from electrical energy. Moreover, high-temperature materials that are being evolved for such applications as missiles may soon find use in industrial equipment.

Kent's interest in such developments is a natural outgrowth of the diversity of his research activities. Since joining the Battelle staff in 1950, he has been associated with the development of electromechanical devices and systems handling frequencies ranging from power line to microwave, electromagnetic devices, special telemetering systems and equipment, and transducers, including large magnetostrictive energy sources for drill strings. He has been responsible for the design and development of magnetic circuits and of control circuitry, some with semiconductor devices for special applications. Kent has participated in studies of the factors affecting railroad electrification as well as in electrical and electonric diversification studies.

Kent came to Battelle with a broad research experience in applied physics. After graduation from The Ohio State University with a B.S. degree in electrical engineering, he joined the Union Switch and Signal Company where he conducted studies in safety control and communication systems for railroad operations. Later he aided in the development of automatic direction finders and submarine-detection equipment at the Airplane and Marine Instrument Company. He was also associated with the wartime development of radio-controlled ballistic bombs.

Kent's professional activities include membership in the American Institute of Electrical Engineers and in the Institute of Radio Engineers. He is a member of A.I.E.E.'s Committee on Electrical Techniques in Medicine and Biology and past chairman of I.R.E.'s Central Ohio Section.

Once a member of the world-record-holding shuttle-hurdle relay team, Kent still retains an interest in track and officates at Ohio State University track meets. Along with his wife Marybelle, he follows the family activities of their two married daughters and the antics of their first grandchild.

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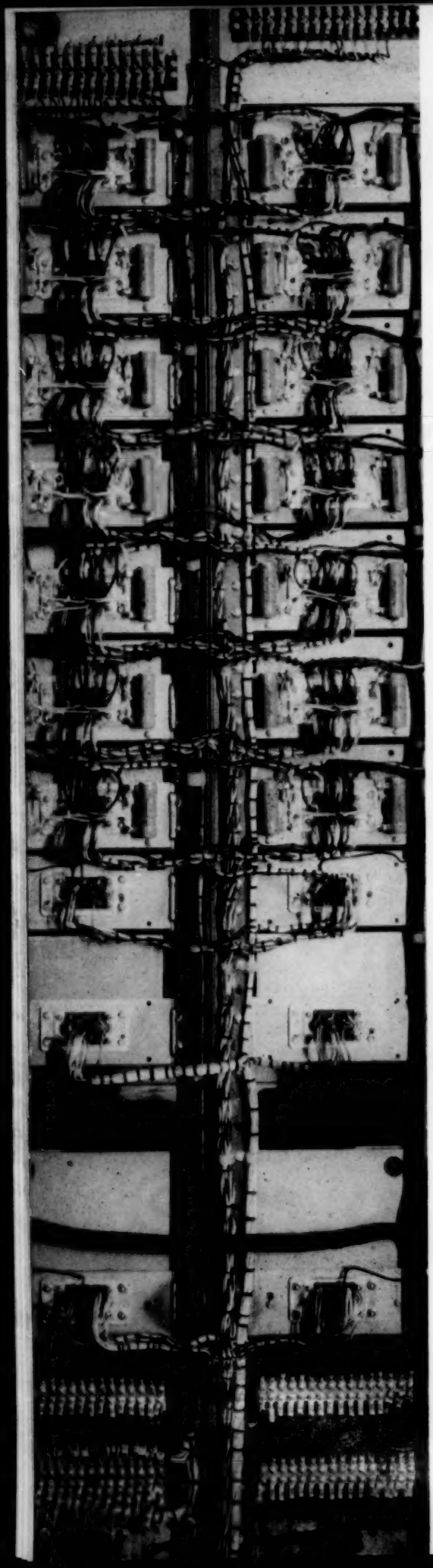

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The Chemists Up-Date Textile Fibers

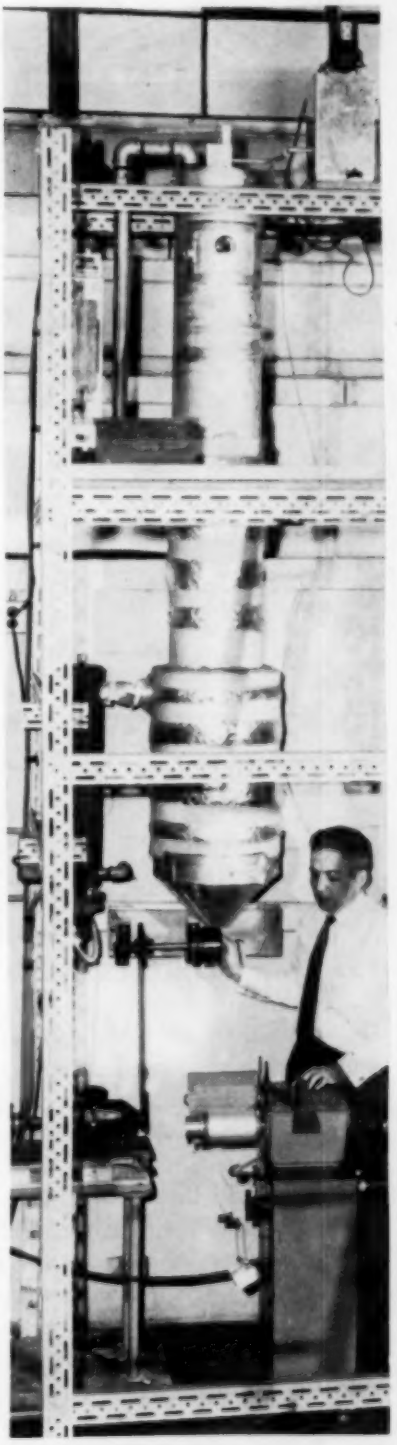
Mechanical ingenuity has led to improved textiles, but has not modified greatly the basic properties of natural fibers. Now chemists not only can make synthetic fibers to fit particular needs, they are also finding methods for giving desired properties to the formerly stubborn natural fibers.

by ROBERT I. LEININGER AND BEN S. DANIEL

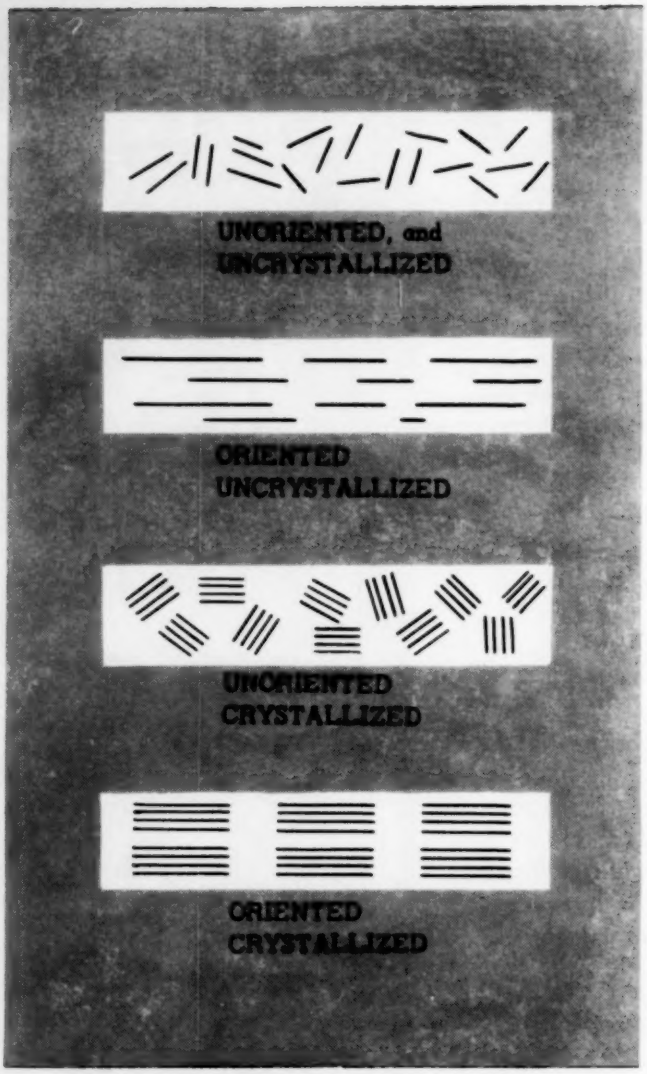
MILLENIUMS AGO, man learned how to make use of fibrous materials found in nature. He first learned how to twist these fibers into strings or yarns, and then some unrecorded genius discovered that these yarns could be woven into cloth. Since this discovery, much time and effort have been devoted to creating different fabrics by mechanical variations in methods of spinning, weaving, and dyeing. Although a large number of fibers have been available over the years, cotton, wool, and to a lesser extent silk, have been the most important.

Until recently, despite all the ingenuity that could be exercised in spinning and weaving, cotton fabrics remained unmistakably cotton and unmistakably shrinkable. Although better breeds of sheep were developed and wool was transformed into warm clothes and blankets with excellent aesthetic qualities, wool continued to mat, shrink, and be eaten by moths. Silk was in a somewhat different position: it was a luxury fabric with a market primarily based upon appearance. Even considered as a luxury fiber, however, silk was far from ideal. When spun into the sheerest fabrics, it was too fragile.

Thus the need has existed for fibers better than those provided by nature. The desired improvements were not possible, of course, until chemical technology had advanced to a high level. The first result of this progress came in the late 19th century with the regeneration of cellulose into rayon. It was not until 1939, however, that high-polymer chemistry and technology matured sufficiently to produce the first successful, completely synthetic fiber, nylon. Since then, synthetic fibers have grown at an almost incredible pace both in numbers and use, as shown in the table on page four. The data in the table show clearly the impact of the man-made fibers on the textile industry during this time. It should be kept in mind that production of the synthetics listed under "other man-made" was first started in 1939-1940. The tremendous production implied by this figure of over six billion pounds of fiber is demonstrated by the fact that the fiber was woven into more than seven million miles of fabrics, counting only those 12 inches or more in width. It should be noted that a sub-



Experimental equipment for dry spinning synthetic fibers. The polymer solution under study is pumped through the spinnerette inside the column at the top. After forming, the filaments are dried as they pass down through the warmed column and are wound on a reel to await evaluation.



Possible Arrangements of Molecules in Fibers

stantial proportion of the natural fibers included in the figures have been chemically modified to a point where they might be considered new materials. The so-called "wash-wear" or "no-iron" cottons are a prime example of this modification.

The demand for improved fabrics has led within the past few years to the development of an array of more than 20 new fibers as well as to modifications of older, natural fibers. Each one of these new fibers is to the textile technologist what a basic new building material is to the construction engineer. To know where and how these new fibers can be used most effectively calls for a study of the many properties which govern their utility. Included among these properties are strength, elasticity, toughness, heat resistance, chemical resistance, rot resistance, moisture absorption, electrical resistivity, and dyeability.

When one considers the total number of fibers available today, their variations, and their chemical and physical modifications, the possibilities for new fabrics is limitless. The properties of natural fibers are compared with those of some synthetics in the table on page three. Differences are apparent among all the fibers but the synthetics as a class show greater toughness, lower water absorption, and greater chemical resistance.

Structural Factors in Synthetic Fibers

In spite of the large numbers and types of fibers and their varying properties, all fibers do have a common structural similarity. They are all thread-like, of course, having a high length-to-diameter ratio. Sub-microscopically the similarity persists, in that the molecules of which the fibers are composed are also threadlike. Actually, these are high molecular materials related to, and sometimes the same as, plastics, rubbers, and natural polymers. In fact, almost any high polymer can be (and has been) spun into a fiber-like form. But to provide a useful fiber, the structure must meet two more criteria, "crystallinity" and "orientation".

Crystallinity in high-molecular-weight polymers is similar to crystallinity in inorganic salts and metals in

Dr. Leininger's research interests at Battelle have been primarily with polymeric materials. Currently he is guiding investigations of methods for physically modifying synthetic fibers and for chemically changing the properties of natural fibers. Another important phase of his research activities is concerned with the effects of radiation upon hydrocarbons and plastics. Leininger's earlier studies included investigations of the use of nylon and Fiberglas in body armor, preparation of materials for use in plastic sponges and floor coverings, development of polymerization techniques, and rapid methods for evaluating polymeric materials.

Since he joined Battelle, Ben Daniel has participated in investigations of the fiber-forming properties of polymers and of techniques for physically modifying synthetic fibers. He has been associated also with studies of processes for chemically modifying cotton textiles. Fiber lubricants, chemicals for modifying fabric finishes, and studies of methods for protecting fabrics from bactericidal and fungicidal attack have also claimed his attention.

FIBER PROPERTIES

Fiber	Tensile strength (lbs/sq in.	Wet tensile strength (% of dry strength)	Breaking Elongation (%)	Toughness Index	Moisture Regain* (%)	Specific Gravity	Swelling in water (%)	Chemical Resistance
Cotton	44,-109,000	110-130	3-7	0.15	7	1.54	44-49	Attacked by strong acids; swollen by strong alkalis
Silk	42,- 83,000	75-95	13-31	0.44	11	1.25-1.35	30-41	Attacked by strong acids and alkalis
Wool	20,- 29,000	76-97	25-35	0.25	16	1.32	32-38	Attacked by alkalis; resistant to most acids
Vis. Rayon (Medium)	46,- 65,000	56-63	15-20	0.21	13	1.46-1.52	45-82	Similar to cotton
Nylon 66	65,- 88,000	85-90	25-31	0.54-0.70	4.5	1.14	2	Attacked by concentrated mineral acids; resistant to alkalis
Orlon (Acrylic)	73,- 88,000	95	15-18	0.43	1.5	1.17	very slight	Attacked by hot, strong alkalis
Dacron (Polyester)	74,- 89,000	100	22-30	0.55-.64	0.4	1.38	0	Attacked by hot, strong alkalis; resistant to acids

*Equilibrium moisture content at 65 per cent relative humidity and 70 F.

that there is an ordered structure. The degree of order is less perfect and the attractive forces between atoms are much weaker than are the bonds in an ionic crystal. Orientation is simply an alignment of the molecules so that their axes are parallel to the fiber axis. The accompanying simplified sketches show possible internal structures of thread-like materials. There are, of course, all gradations of order from amorphous to crystalline.

The degree to which any of these idealized structures is achieved will profoundly affect the properties of the fiber. Qualitatively we may list the following:

Increasing crystallinity leads to (1) Increased tenacity (tensile strength); (2) Decreased elongation (increased brittleness); (3) Decreased chemical reactivity; (4) Decreased water absorption; and (5) Decreased dye affinity. The effect of increasing orientation, on the other hand, is (1) Increased tenacity; (2) Decreased elongation; and (3) Increased luster.

Crystallinity and orientation overlap. In fact, a change in one is often accompanied by a change in the other and the effects cannot be precisely separated. The total properties of any fiber depend on the structural factors discussed above, the chemical groups and linkages present, and the shape and surface of the fiber. With all these factors influencing their character, it is apparent that modern fibers offer a vast array of properties. The natural fibers, on the other hand, with their practically invariant structural factors, can offer only a limited selection of properties. Over the years, craftsmen, by the exercise of considerable ingenuity, succeeded in preparing a very wide range of fabrics by mechanical variations in yarn making and weaving. Despite the cloth variations, however, fabrics made from the same natural fibers all have much the same properties. Cotton fabrics are still cotton and not silk.

Methods with Man-Made Fibers

The unchanging properties inspired Count Chardonnet, in 1885, to search for and find a commercial process for "artificial silk". This first man-made fiber was a regenerated cellulose which had been spun into a fiber as soluble cellulose nitrate and then denitrated to cellulose. Although the starting material was cellulose (usually cotton), the regenerated cellulose fibers had decreased crystallinity and differed also in shape and surface from cotton fibers. These changes were sufficient to give a silken luster and a greatly changed texture from that of cotton.

From this point on, rayon progressed rapidly with the development of the viscose and cupramonium processes to give regenerated cellulose. It might be pointed out that rayon has grown from a world production of 1000 tons in 1900 to well over a million-and-a-quarter tons in 1952.

The development of rayon added greatly to the range of fiber properties available, but not to the degree desired. Direct and total replacements for silk and wool were desired as well as fibers with completely new properties. How well the chemist has succeeded in this quest can be readily seen from the number of fibers available. In addition, new fibers are

announced almost monthly by the chemical and textile companies.

Before going on to descriptions of some of these synthetic fibers let us briefly consider the methods for the conversion of high molecular weight materials into fiber form. In essence, the first step follows the method of the silk worm: the material is extruded through a tiny orifice, after which the filament hardens in a thread-like form. The hardening can be achieved by cooling a molten material, by removing a solvent through the use of heat, or by the action of a non-solvent which coagulates the polymer. In the above order, these methods are formally known as melt, dry, and wet spinning. The choice in any instance will depend on the polymer properties.

All of these spinning methods produce fibers which are comparatively weak because of the lack of orientation of the molecules. Orientation is achieved by a drawing operation in which the fiber is rapidly stretched to up to ten times its original length. In some cases, it is also necessary to induce crystallization by appropriate heat treatment.

Examples of Synthetic Fibers

Nylon. Of all synthetic fibers (excluding the cellulose derivatives) nylon has received the most intensive study and achieved the greatest commercial success. Introduced in 1939, the fiber reached a volume production of close to 300 million pounds last year.

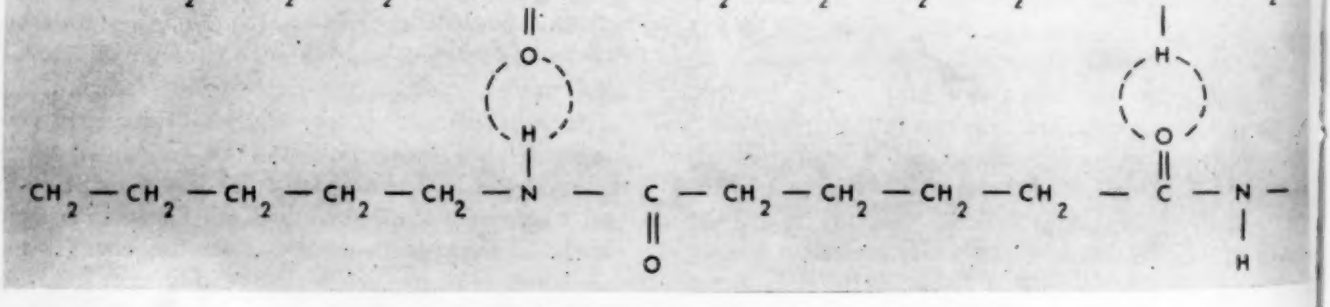
Nylon is a generic term for synthetic fiber-forming polyamides. One of the several available, nylon-66, is the condensation polymer of adipic acid and hexamethylene diamine. Its structure is represented in the figure below.

It is seen that there is a regularity in structure which permits crystallization. Furthermore, the proximity of chains in this regular order enables hydrogen bonding between them, which, in turn, enhances the strength and increases the melting point of the polymer. There are many variations possible among the polyamides. Length of the diacid or diamine can be varied and combinations of "monomers" can be used to form copolymers. As the regularity of the structure or the opportunity for hydrogen bonding is decreased by copolymerization, strength and melting point will decrease. Other properties such as flexibility and elongation may increase correspondingly. Water absorption will decrease as the length of the diacid or diamine increases since the number of polar groups will decrease.

U. S. Fiber Consumption (Millions of pounds)

Fiber	1920	1955
Cotton	2,822	4,382
Wool	314	419
Rayon and Acetate	8.7	1,419
Other man-made	..	431
Flax	13.3	8
Silk	38.8	11
Total	3,196.8	6,670

Acrylic Fibers. This class of fibers is based on the addition polymer formed from acrylonitrile as shown on page five. Such a structure is less crystalline than the nylon pictured above, but it is the basis for a number of important fibers. The resistance of this fiber to outdoor weathering is outstanding. Its water absorption is low, leading to its use in quick-drying and crease-resistant fabrics. Because fibers of unmodified polyacrylonitrile are difficult to dye, improvements have been made through copolymerization with monomers such as vinyl acetate or vinyl pyridine, which provide "dye-acceptance" sites. Copolymerization reduces the fibers' crystallinity, but through a successful

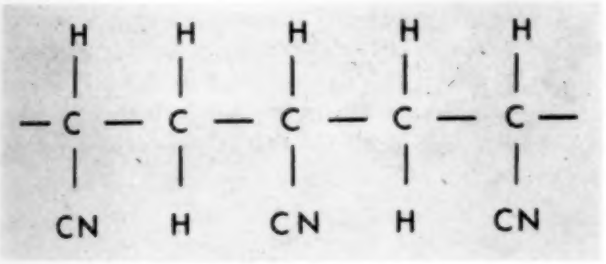


Structure of Nylon 66

compromise a balance of properties can be arrived at. Some of the fibers based on acrylonitrile are Orlon (Du Pont), Acrilan (Monsanto), Dynel (Union Carbide), Creslan (American Cyanamid), Verel (Tennessee Eastman), and Zefran (Dow).

Polyesters. These are similar to the nylons in that they too are condensation polymers. The only U. S. example, Dacron (Du Pont) is polyethylene terephthalate with the structure shown on this page. The properties of the polyesters are excellent. Probably their greatest disadvantages are difficulty in dyeing and the fact that they are higher in price than the acrylic fibers. Satisfactory dyeing methods and dyes are available and larger volume production will probably reduce the cost. At present the largest uses are in blends with wool and the cellulosics, where the polyesters impart fast-drying minimum-care characteristics.

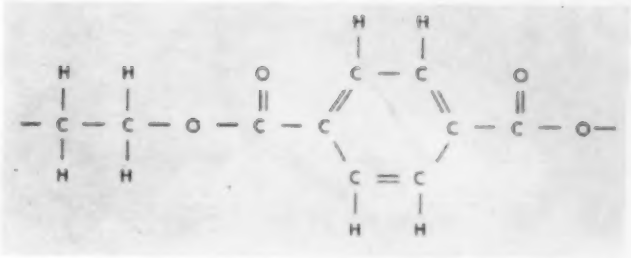
Polyolefin Fibers. A new class of fibers is looming on the horizon as a result of recent advances in stereospecific polymerization. Ethylene, propylene, and other olefins have been polymerized through the action of



Structure of Polyacrylonitrile

new catalysts to highly crystalline, high-molecular-weight materials. This increase in crystallinity has produced corresponding increases in strength and melting point so that these polymers are now likely fiber candidates in many uses. Other advantages include low density and low cost. The disadvantages of the fibers stem from their purely hydrocarbon make-up which makes dyeing difficult and limits their heat resistance. Montecatini in Italy has produced a polypropylene fiber, Moplen, but very little is available on such fibers to evaluate their probable place.

Other Synthetic Fibers. Only four broad classes of synthetics have been mentioned above. Many other materials have been made into fibers and some are commercially important and others doubtlessly will be in the future. Glass, polyvinylidene chloride (Saran, Dow; Velan, Firestone), polyvinylchloride, and polytetrafluoroethylene (Teflon, Du Pont) are some available. Polyvinylidene cyanide (Darvan, Goodrich) is also going into production.



Structure of Polyethylene Terephthalate

Improving Natural Fibers

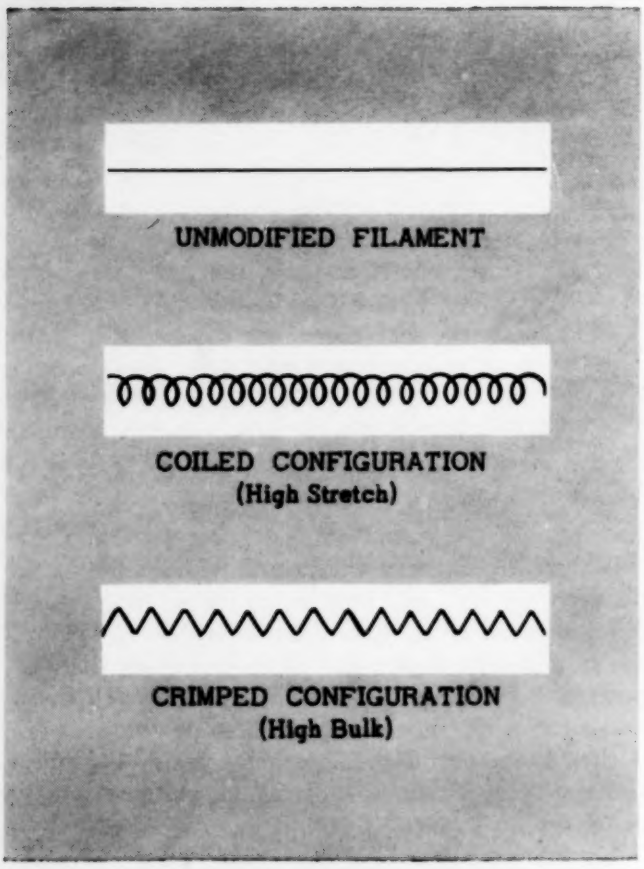
In the early stages of what could be termed a battle between natural and synthetic fibers, the natural fibers suffered severe losses. But competition, in turn, has stimulated research and development for the purpose of modifying the natural fibers by chemical treatment or chemical finishes. These new finishes are designed to impart to the fibers more desirable properties especially those of dimensional stability, crease resistance, and others.

Notable advances have been achieved in this field of chemical finishing. For example, cotton goods are now being finished to a high degree of crease resistance to produce wash-wear fabrics. This improvement is accomplished by application to cotton of reactive types of resins which crosslink with cellulose to impart crease resistance and dimensional stability to the fabrics. The reactive nature of cotton cellulose is used to advantage in making other modifications which depend on forming cellulose ethers or esters. Included in new materials produced by such reactions are acetylated, cyanoethylated, and phosphorylated cotton. Research is also being conducted with wool to improve properties including dimensional stability, alkali resistance, and launderability.*

Physical Modification of Synthetic Fibers

As natural fibers are extending their usage by chemical changes the synthetic fibers are continually being improved to meet specific end uses. The thermoplastic nature of the synthetic fibers facilitates their physical modification by application of heat or plasticizers to set them in various shapes. Early in the use of yarns made from staple fibers for knitting, serious problems were created because the ends of fibers balled up to

* It could be argued, with considerable justification, that these chemically treated natural fibers are now in reality synthetic.



METHODS OF PHYSICALLY MODIFYING SYNTHETIC FIBERS

form "pills". Physical modifications of continuous multifilament yarns followed to meet this problem.

Yarns which have been physically modified fall into two general categories — those having high stretch properties and those having high bulking properties. The individual filaments in these yarns may have the types of configurations or combinations of them that are shown in the illustration on this page.

Technologists have been most successful in modifying nylon continuous filament yarns, but these modifications are expected, in the future, to be extended to other fibers such as the polyesters and acrylics. The use of these modified synthetic yarns is expanding at a very rapid pace as new yarns including Banlon (Joseph Bancroft and Sons), Tycora (Textured Yarn Company), Helanca (Heberlein Patent Corporation), Fluflon (Marietta Mills), and Agilon (Deering Milliken Research) are finding wide acceptance at the consumer level. Knitted sweaters and stretch hosiery have been the volume items to date. However, interest in modified yarns for the carpet industry is high, and eventually these yarns may also be used in fabrics.

NONWOVEN FABRICS

Another new development in textiles which will affect both synthetic and natural fibers is that of the nonwoven fabrics. Almost any fibrous material can be utilized in the production of nonwovens. A random web of the fibers is first made which is then impregnated with a bonding agent and dried to produce a nonwoven fabric. This segment of the textile industry, although initiated very recently, is expected to produce 90 million pounds of fabric in 1958 with the possibility of a production of 200 million pounds in 1960.

One of the great advantages of the nonwoven fabrics is that the manufacturing operations lend themselves easily to automation. The processing is simpler, and the operations are fewer than in weaving. It is therefore conceivable that many of our future fabrics may be produced by highly automated processes.

The ultimate goal of the nonwoven manufacturers is to break into the apparel field. In this atomic and space age there is increasing interest in disposable garments. New and cheaper methods of fabricating the nonwovens into garments will be necessary to make these disposable items of interest costwise. Moreover, the nonwovens produced to date tend to lack some of the aesthetic qualities desired in fabrics for garments. Further research and development in this field should improve nonwoven fabric properties including those of aesthetic appeal, durability, identity as a textile, and others.

CONCLUSION

The textile industry today has many problems. Paramount among them at the present time is the industry's capacity for overproduction. Many marginal producers have had to close their doors, and some of the larger companies have found it necessary to curtail production to keep inventories in line. However, it is believed by many in the industry that most of the adjustments have been made.

Of perhaps greatest concern to the textile manufacturer today is the problem of promoting sales of textiles. During the post World War II years, the percentage of the consumer dollar going for textiles has steadily declined. Manufacturers are searching for new ideas and methods to reverse this trend. Research and development effort can be expected to aid in this endeavor in the coming years. Certainly with the vast array of fibers already available and with those to be expected in the future, more and more desirable textiles will be produced, which in turn will help to create greater demand.

The utilization of agricultural raw materials calls for extensive technological research. Shown here is a step in the study of linseed-oil properties. The samples of drying oil on the panels, after a period in the atmosphere box, are weighed to determine how the material has reacted chemically to a specific atmosphere.

Factors in Chemurgy's Future

Chemurgy, because it offers a means of increasing the utilization of farm products, continues to attract public interest. The author considers the obstacles facing those who seek to utilize a chemurgic approach to certain current agricultural problems, and he discusses some means that may help to make such efforts fruitful.

by ODIN WILHELMY, JR.

"CHEMURGY" IS A WORD coined some 30 years ago in this country to describe the application of chemistry and related sciences to the problem of increasing the industrial utilization of agricultural products. By definition, chemurgy encompasses the finding of new nonfood uses for conventional farm crops, the discovery of profitable uses for agricultural residues, and the development of new farm crops as a source of new or existing products.

Interest in the field of chemurgy has fluctuated widely since its inception in the late 1920's. During the period prior to World War II, chemurgy held out a hope of alternative industrial outlets for depression-induced surpluses of farm crops. With the advent of the war and the sharply increased demand for food and fiber, the problem shifted from one of surplus disposal to one of adequate production of materials needed in the war effort. Farm crops, through chemurgy, became a source of certain chemicals, as well as conventional food, feed, and fiber products.

Subsequent to World War II, interest in chemurgy sagged as supplies of more economic nonagricultural sources of industrial raw materials such as petroleum and coal again became adequate. Moreover, farmers stepped up their output of food and fiber to keep pace with rising population. By the early 1950's productive

capacities of United States farms had caught up with demand, and in recent years this country has had mounting surpluses of various farm crops. Once again the United States finds itself in an agricultural environment such as gave rise to chemurgy originally, and once again interest in finding industrial outlets for agricultural materials is growing. Evidence of this interest can be seen in: the appointment by President Eisenhower, in 1956, of a "Commission on Increased Industrial Use of Agricultural Products" (which reported its findings to Congress in the spring of 1957); a congressional bill sponsored by Senator Homer Capehart for a $100 million "crash" research program in chemurgy; and the inclusion in the proposed 1958-59 federal budget of a request for a substantial increase in research and development funds in this field.

Past Achievements

The foregoing is not intended to suggest that nothing has been accomplished thus far; such is certainly not the case. Research and development groups in both government and industry have done a great deal of productive work in chemurgy that has resulted in hundreds of industrial applications for agricultural products. The adjoining table is indicative of the extent to which agricultural crops and residues are being used in a multitude of nonfood, nonfeed applications.

However, the surface has only been scratched in this regard, and the full potential of chemurgy is far from being realized. Only seven per cent of the total cultivated farm acreage in the United States is now used to produce items consumed for industrial purposes. The wholesale value of these items represents slightly more than ten per cent of total cash receipts from farming. At the same time, total expenditures for agricultural research in the United States (half of which comes from government sources) amount to about one per cent of farm cash receipts, compared to an average of three per cent of gross sales income invested in research by all manufacturing industry.

Economic Problems

Probably the major reason for the slow growth of chemurgic industries has been the unfavorable economic environment surrounding many technologically sound chemurgic processes. In its interim report to the Congress, the President's Commission points out that "some 300 processes have been developed or perfected (in the four regional Utilization Research Laboratories of the U. S. Department of Agriculture) which either await industrial adoption or the proper economic situations to make them commercially profitable".

It is the purpose of this paper to point out some of the economic obstacles that must be overcome by anyone who decides to develop and market an industrial product made from an agricultural material. In general, the problems discussed here are common to all materials of agricultural origin, whether they be surplus foods or feeds, crop residues, livestock by-products, or wastes resulting from food processing or industrial operations based on agricultural materials. The significance of a particular obstacle will vary, of course, with the individual crop or residue concerned.

Assembly and Transportation of Materials

The first problem encountered in the industrial use of agricultural materials, particularly agricultural residues, is their assembly. Such materials often are widely scattered over a broad geographic area. Most of these materials are also very bulky. One need only think of corn stalks or wheat straw to appreciate the potential cost of gathering together a sufficient volume of a given material to permit its economic conversion to an industrial product. Beyond the initial physical assembly of the material into carload lots or truckloads is the problem of its transportation to a processing point. One simply cannot move a trainload of corn stalks or wheat straw over any significant distance and then expect to process these residues into some useful end product and sell it at a competitive price. The cost of getting the raw materials to the processing point would leave little or nothing with which to pay processing costs.

There are, of course, exceptions to the above general rule. Occasionally, circumstances may cause the bringing together at one location of sufficient quantities of a material to make it economically usable. The Quaker Oats Company found itself with enough oat hulls at one place to permit their use in the production of

Since he joined the Battelle staff, Dr. Wilhelmy has participated in numerous agricultural economic studies both in this country and in Latin America. His research has encompassed problems concerned with such products as trace elements, livestock feeds, fertilizers, insecticides, drying oils, and poultry by-products. Earlier, utilizing his background in chemistry, nutrition, and agricultural economics, the author had served as a food economist on the faculty of Cornell University. He received his Ph.D. degree in agricultural economics from the same institution.

furfural, a chemical used in nylon manufacture, and in solvent extraction of petroleum fractions. Meat packing houses and some poultry slaughtering plants, handling large numbers of livestock through a single plant, have found it profitable to make something out of "everything but the squeal". And in recent years, tremendous government stockpiles of various agricultural commodities might be classed as unusual concentrations of materials.

Lacking such a concentration of material, a potential solution to this problem of assembly and transportation lies in the technique of local semiprocessing. This solution might involve compressing, extracting, dehydrating, cooking, distilling, or even a simple chemical treatment. Such processing might be done adjacent to or in a farm field, using a portable semiprocessing plant mounted, perhaps, on a railroad car or a truck bed. A cannery, during the off-season, would be another possible mechanism for this job. Local semiprocessing is certainly not an unknown concept. It is highly developed in the fishing and whaling industries where bulk and weight are reduced, and spoilage prevented, by semiprocessing the product on the ship at the fishing grounds.

Plant Investment Costs

In many instances, the production of an industrial product from an agricultural raw material may require the use of a process differing significantly from processes previously used. If such is the case, a processor, in order to utilize such a raw material, may find it necessary to make major changes in an existing plant or to build an entirely new plant.

Should a processor take this step and build the necessary plant, he would still face two additional major risks, for reasons that will become evident shortly. One of these would be a disappearing market for his product; the other, a disappearing or inadequate supply of the agricultural raw material on which the process is based. Under such circumstances, it is only reasonable that a person taking such risks would expect a definite incentive for doing so, plus some assurances that his position would be protected once he had assumed the risks. The best assurance in this regard would be concrete evidence, in advance, that the process being exploited had a good chance of becoming economically self-supporting within a reasonable period of time.

Price Stability

Prices of chemicals, pharmaceuticals, and other industrial products that could logically be made from agricultural raw materials are traditionally quite stable. In fact, the successful and continuing sale of such

ESTIMATED QUANTITY AND VALUE OF DOMESTIC AGRICULTURAL PRODUCTS USED BY INDUSTRY—1954-1955

(from *Report to the Congress from the Commission on Increased Industrial Use of Agricultural Products*)

Farm Products	Estimated Quantity	Estimated Value
COTTON PRODUCTS		
Cotton	14,721,000 bales	$2,382,000,000
Chemical grade linters	1,406,000 bales	11,400,000
Nonchemical grade linters	732,000 bales	13,600,000
TOBACCO		
For smoking, etc. (unstemmed)	1,438,000 lbs.	700,000,000
Nicotine	1,350,000 lbs.	3,200,000
Stems and scraps	200,000,000 lbs.	100,000
MEAT INDUSTRY		
Cattle hides and skins	27,400,000	215,720,000
Calf and kip skins	13,300,000	81,795,000
Sheep and lamb skins	16,318,000	14,618,000
Fleshings and trimmings	520,000,000 lbs.	1,560,000
Hair	54,000,000 lbs.	2,430,000
Animal glues	110,000,000 lbs.	20,000,000
OILS AND FATS (ANIMAL AND VEGETABLE)	2,514,000,000 lbs.	300,896,000
GRAINS		
Wheat (for industrial alcohol)	276,000 bu.	228,000
Wheat (as monosodium glutamate)	15,000,000 lbs.	22,500,000
Corn (for industrial alcohol)	1,078,000 bu.	1,450,000
Corn (as corn starch)	1,200,000,000 lbs.	84,000,000
Corn (as dextrin)	178,000,000 lbs.	17,020,000
Corn (as syrup and sugar)	134,000,000 lbs.	11,000,000
Corn (as isolated protein-Zein)	6,000,000 lbs.	2,280,000
Grain sorghum (industrial alcohol)	520,000 cwt.	1,010,000
WOOL AND MOHAIR PRODUCTS		
Wool (greasy)	230,343,000 lbs.	126,109,000
Degras (wool grease)	8,500,000 lbs.	2,000,000
Mohair	11,660,000 lbs.	11,138,000
SUGARCANE AND BEET		
Molasses	85,000,000 gal.	12,000,000
Beet pulp	2,000,000 tons	26,000,000
Bagasse	800,000 tons	18,970,000
NAVAL STORES (TURP. AND RESIN		26,100,000
Dairy products		
Casein	5,000,000 lbs.	1,750,000
Lactose	25,000,000 lbs.	2,250,000
MISCELLANEOUS		
Poultry feather meal	100,000 tons	9,000,000
Poultry tannage and dry scraps	100,000 tons	7,000,000
Tannin	13,518 tons	5,170,000
Soybean isolated protein		12,500,000
Lecithin		1,300,000
Pectin (from cannery waste)		500,000
Furfural (from corncobs)		12,000,000
Ramie		1,200,000
Flaxtow	20,000 tons	1,600,000
Nutshells	25,000 tons	2,000,000
Misc. uses for corncobs	60,000 tons	1,000,000
Misc. uses for straw	700,000 tons	20,000,000

products to industrial or consumer markets rests in large part on this relative price stability. Agricultural products, on the other hand, are notoriously unstable in price, fluctuating from day to day or season to season depending on the commodity concerned.

Thus, the problem involved in producing a stable-priced product from an unstable-priced raw material must be faced. The problem is particularly clear-cut when one compares agricultural commodity prices with those of petroleum or coal, the relatively stable-priced raw materials that are and will be the primary competitors of agricultural materials.

Supply of Materials

Paralleling this problem of price instability is another one of equal seriousness in the eyes of the processor—that of instability and uncertainty in the supply of the agricultural raw material. There are several facets to this problem. In one case, a manufacturer may be depending for his raw material supply on the production of that commodity in a given geographical area. It is not difficult to imagine weather conditions that would wipe out a crop or so reduce its volume that his operation would be left stranded.

In another instance, a processor might build a plant and go into business on the strength of stores of an agricultural commodity that had been stockpiled from previous seasons. Again it is not difficult to image circumstances that would leave him without an adequate raw material supply once the initial stockpiles had been used up. There may be other situations in which the supply of a material may initially be adequate, but unforeseen future events may cause it to shrink. For example, the current supply of coffee grounds in the United States, resulting from the manufacture of instant coffee, is perhaps 250,000 tons per year. There is evidence, however, that instant coffee production may be shifted to Central and South America to save transportation costs. Should the entire instant coffee industry take this step, there would be no coffee grounds available in this country as a by-product of its manufacture.

A similar example can be cited in the case of imported tung oil, an important ingredient of paints in this country prior to World War II. Imports of this oil in 1940 amounted to 97,049,000 pounds. Three years later, imports were only 68,000 pounds, since trade with China had been cut off by the war. U. S. paint manufacturers turned to other oils and their modifications as replacements for tung oil. In a case such as this, the solution to the problem may lie, at least in part, in concentrating, preserving, and stockpiling the crop or residue in question to assure an adequate future supply.

Another aspect of this over-all supply problem that is even more difficult to control is the variability in the quality or composition of the raw material. Variability is inevitable in materials of biological origin, and this aspect of the problem could be fully as important as supply per se unless the production process has enough flexibility to permit the use of materials across a broad composition or quality range.

Utilizing the Entire Commodity

The ability to use an entire commodity is less frequent in cases where conventional crops or livestock products constitute the raw material of the chemurgic process than when residues are being used. Many of these conventional crops or livestock products such as corn, wheat, and milk form a natural and complete unit in themselves and are ideal for food or feed purposes. However, when they serve as the bases for manufactures, rarely, if ever, can the entire natural products be used. The products must be separated or split into their individual components to make them industrially useful.

The splitting process adds to production costs, and, at the same time, usually results in the creation of some new waste material that must be disposed of. A prime example of this can be found in the industrial utilization of skim milk. This product, a wholesome and useful food, can be readily split into its two primary components—casein and lactose or milk sugar. There is a ready industrial market for casein, mainly in the sizing of paper. Lactose, on the other hand, is severely limited in its industrial applications because many of the products that may be manufactured from lactose can be made more economically from cheap and abundant sucrose.

Problem of Product Quality

In some cases, an industrial product made from an agricultural raw material may be inferior in quality to that producible from petroleum or coal or by means of some other synthetic organic chemical process. Perhaps the best examples of this can be found in the industries using oils of agricultural origin. In recent years, latex emulsion paints, based on nonagricultural ingredients, have made significant inroads into paint markets that formerly were the domain of oil-based paints originating from agricultural sources. This is particularly true in the case of interior finishes. The latex paints gained their position because they were found to have some important quality advantages over paints made from agricultural oils. Similarly, synthetic resin-based printing inks have been developed that permit higher speed printing operations than were previously possible with oil-based inks.

The answer to this problem, while perhaps not readily achievable, at least is readily recognizable—improve the agriculturally based product until it is equal or superior to the synthetic product. Chemical modification of the agricultural oils has been found effective in upgrading the quality of paints based upon them. Or, borrowing the philosophy of "If you can't beat 'em, join 'em", an agricultural oil can be combined with a synthetic material to yield a superior product. The success of alkyd flat interior enamels, made principally from soybean oil and certain chemicals, is a striking example of such a process. Admittedly, such modifications or additions add to production costs, but they certainly seem justifiable if the resulting product is marketable at a price high enough to cover production costs.

Price Competition

As indicated in the section just above, price competition from products of nonagricultural origin is another problem that may have to be overcome in establishing a chemurgic product. Assuming that a high-quality product can be made from agricultural materials, one may still face the problem of being unable to compete pricewise with products derived from nonagricultural sources. Numerous examples could be cited of chemicals that can be produced equally well from grain or from petroleum, none of which is being made from grain because of unfavorable economics. Similarly, one can cite the remarkable growth in the use of tall oil (a by-product from the manufacture of paper by the sulfate process) as a paint ingredient in place of other semidrying or drying oils of agricultural origin. Some years ago tall oil's poor quality made it unattractive as a paint constituent, in spite of its low price. However, through research, its quality has been upgraded to the point that it is a strong competitor of more expensive oils in a number of paint-manufacturing applications.

Effects of the Farm Price-Support Program

One final factor affecting the progress of chemurgy that should be mentioned is the price-support phase of the Federal farm program. Regardless of one's attitude, one must agree that price supports tend to discourage the use of agricultural products.

Farm price supports are designed to keep the prices of certain agricultural commodities at a level higher than they would otherwise be. This situation in itself discourages the use of farm products as industrial raw materials, since raw-material price is a prime factor in the economic feasibility of such chemurgic operations. Price supports also discourage shifts from the growing of what are now surplus crops to the production of new crops that might prove valuable as industrial raw materials. Finally, price supports tend to encourage overproduction of the supported crops, thereby reducing the chances of using up existing and future farm surpluses in industrial markets. Thus, one goal of chemurgy—balancing agricultural production and consumption—is made more difficult to achieve.

One obvious solution to this problem is to find and use some mechanism other than price supports to protect the farmer from economic catastrophe. So long as agricultural commodities are price-supported, the finding of industrial uses for those commodities will not in itself eliminate the problem of farm surpluses. Chemurgic applications may increase the total demand for a given crop, and the surplus of a crop in any one year may thus represent a smaller percentage of that crop's total production. However, the likelihood of a surplus would not be significantly reduced from what it was before the chemurgic use entered the picture as an additional market.

Considerations on a Suggested Program

A program of action suggested to overcome these and other obstacles to the progress of chemurgy has been spelled out in detail by the President's Commission in its report to Congress. The suggestions made below in general merely echo or highlight the recommendations made in that report.

Action logically divides itself into two distinct phases—immediate steps to get more promising laboratory-proved processes and products off the shelf and into commercial production, and a longer range effort to explore and expand chemurgy beyond its present limits. "Incentives" and "education" are key words in the first of these phases. It has been proposed that if any significant share of the 300 processes now ready for commercialization are to achieve that status, specific and tangible incentives must be offered to farmers, to the railroads, to processors, and to others that would be instrumental in making and keeping a given commercial process profitable. These incentives, it is pointed out, could take several forms, including credit, rapid amortization, favorable changes in legislation, tax advantages, and freight subsidies—but they must be present if action is to be forthcoming. Concurrently, there would be education—of the farmer, the railroads, industry, and the ultimate consumer—to show these people the potential benefits that will accrue to them if a given chemurgic process is commercialized.

Care must be exercised in the use of incentives, however, if distorted economic situations in some industrial uses of agricultural materials are to be avoided. The incentives chosen to stimulate the commercialization of a given chemurgic process must be

tailored in each instance to the individual problem. Secondly, incentives should be used as a stimulant only where needed and only for those processes that hold definite promise of being able to stand on their own feet technically and economically within a reasonable period of time. Finally, it must be clearly understood at the outset by all parties concerned that these incentives were being offered only as temporary props and would be withdrawn when a given chemurgic process has been proved profitable in its own right, or as soon as it becomes evident that such a status is not achievable. Similar incentives have been used in the past to help various mining and manufacturing industries overcome initial economic obstacles and, if properly understood and applied, might help new chemurgic processes get established.

Over the longer range, additional research might well supply logical answers to some of the obstacles confronting chemurgy. Such research should have a broad approach, ranging from studies of the properties and values of plants not now grown commercially, to the development of equipment such as a portable semi-processing device for converting cornstalks into a liquid concentrate. Likewise, such research would best be both technical and economic, with perhaps more emphasis on economic research since relatively less work has been done on this aspect of the problem than on technical aspects. Two specific programs would seem to be logical: (1) a careful screening of the many recommendations of the President's Commission to determine those that are most promising both technically and economically; and (2) a comprehensive survey of chemurgic raw materials in the country to determine their volume and location and their relative ease of assembly.

Attainable Benefits

The possible benefits attainable from the successful prosecution of the above program of action are fourfold. One of the immediate benefits, potentially, of finding new industrial markets for conventional farm crops would be to relieve the Federal Government of some of the burden and expense that it now carries in its farm price-support program. If a portion of existing accumulations and future surpluses of farm crops can be sold to industrial markets, the cost to the government of buying, handling, storing, and disposing of these crops could be significantly reduced. Likewise, insofar as industrial markets succeeded in reducing these surpluses, their depressing effect on prices of various crops in conventional markets would also be reduced.

Secondly, the development of profitable industrial markets for agricultural wastes or residues would provide farmers with an additional source of income and would contribute to the strength of the over-all farm economy. Thirdly, increased know-how and facilities for using agricultural materials to make industrial products would be a valuable standby resource in the event of future national emergency or shortages.

Finally, it must be recognized that the farmer would by no means be the only one to benefit from successful chemurgic activities. Financial benefits would also accrue to those who processed the crops or residues into industrial raw materials, to the manufacturers who used these materials to make other products, to the railroads or truckers who transported the raw materials or finished products, and to others. It may be reasonable to hope that new industries, new employment, and new wealth would all be created.

"PIONEERS" AND "COLONIZERS" IN SCIENCE

"Frontier science is exploratory and adventurous. Here ideas are tentative and impermanent, coming and going rapidly. More often than not they are audacious guesses or vague hunches that rarely conform to established patterns of thought. Often they are thoroughly unorthodox and what many peole would even regard as "unscientific". This is science in the raw—controversial, competitive, inefficient, governed to a considerable extent by the demands and urgencies of the moment, and employing *ad hoc* methods. It is the science of the restless explorer, always on the trek, never stopping anywhere very long—always looking for new horizons and taking the frontier with him.

"The science of the interior, by contrast, is that of the intellectual colonizers who follow the pioneers, consolidate gains, and establish order and respectability. It is characterized by much less fluctuation and change, and therefore by relative permanence; by stem, precedence, and closer adherence to established canons of methodology and thought; by logic more than hunch."

Harold K. Schilling in *Science*

NOTES from BATTELLE

* RESEARCH REPORTS AVAILABLE

A vast amount of the technological research carried on for the U. S. government is of great value to industries and others concerned with technical progress. Each year, numerous reports on government-sponsored research are released for public use and are obtainable from the Office of Technical Services.

A listing of available reports on research done for government organizations by Battelle is now available. Compiled by Mary Ellen Thomas and Ralph L. Darby, *Battelle Research Reports* lists 583 titles of reports prepared at Battelle Institute.

The fields covered by these Battelle reports include: economics, chemistry and chemical engineering, corrosion, electrochemistry, electronics and electrical engineering, engineering design, fuels and combustion, metallurgy and metallurgical engineering, ore beneficiation, physics and nuclear technology, and coatings.

Battelle Research Reports may be obtained from the Institute's Publications Office.

* STATES AND NUCLEAR CONTROLS

"In dealing with nuclear energy, we are attempting to visualize what controls may be required in the future, and greet this new industrial dimension with a ready-made set of rules", Howard R. Batchelder of Battelle recently told the Midwestern Regional Conference of the Council of State Governments. "I do not advocate the operation of nuclear installations without regulation and control", he went on, "but I do believe that regulations should be imposed only as the necessity is apparent, that they be cast in a form that will permit revision as this becomes necessary, and that no panic, hysteria, or political self-seeking be permitted to influence the regulations that may be applied.

Batchelder advised a cautious approach to state regulations so as to achieve the most freedom consistent with public welfare. He also stated that there is a real need for a uniform code of state laws. "The problems are common to all states—the solutions should be carefully worked out on a cooperative basis, and the applications should be uniform."

"The peaceful applications of atomic energy", the conference was told, "fall into two very broad categories—the generation of heat or electric power by nuclear fission and the production and use of radiation. The latter is probably most important from the standpoint of state regulations, control, and inspection. In preparation for the time when the states play an active role in this area, an educational program for legislators, officials, and citizens should be prepared. Such a program should be planned to achieve the most objective approach possible to legislation for and enforcement of regulations in the field."

* WOOD SUBSTITUTE

Lightweight inorganic planks and panels, which are products of the laboratory rather than the forest, may soon supplement the nation's lumber supply. Produced from a Portland cement-based material, the new material has many of the desirable properties of wood.

Yet unnamed, the new material was developed for Wells Manufacturing Company by Battelle technologists. M. Jack Snyder, in charge of the Institute group conducting the research, said that the wood substitute is produced by casting a mixture of Portland cement and other inorganic materials in molds and steam curing it. The material weighs only 35 pounds per cubic foot, i.e., it has about the same density as wood. Like wood, it can be sawed, nailed, or glued. Conventional wood-working tools can be used to work this material, which possesses good flexibility. The laboratory-produced "timber" is fireproof, rot-proof, and does not expand in humid atmospheres. While having only about half the strength of hard woods, the material is "strong enough for many jobs now done with wood", the Battelle scientist said.

The new material is now being produced on a pilot-plant scale for field study. Asked how the new material will compare in cost with wood, Snyder reported that it may well compete with a number of building woods. The fact that the material is cast in molds may make it economically more attractive, since this may eliminate some of the hand finishing that wood demands.

Snyder termed field studies conducted thus far as "very encouraging".

The original research program called merely for a substitute material to replace the blocks of cherry wood used by printers to mount photo engraving plates. However, the company foresees much broader usage for the versatile material finally developed.

ALUMINUM-COVERED STEEL WIRE

Aluminum-covered steel wire "having the strength of steel along with high conductivity and corrosion resistance"—a combination long sought in the electrical industry—is now being produced in limited quantities. The new process, described as unlike existing ones for coating steel wire in a bath of molten aluminum, is the result of an extensive research program sponsored by Copperweld Steel Company at Battelle.

Copperweld has, thus far, not released technical information on how the process works. However, John G. Kura, who heads the Battelle group that developed the new process, has described in some detail the "built-in" qualities of wire produced by the process developed at Battelle. His description:

"On wire produced by the new process, the aluminum covering may be applied to a thickness not previously possible. It is this heavier aluminum layer which greatly increases electrical conductivity. Moreover, the continuous process, which lends itself to automation, produces an aluminum coating that is not only thick but remarkably uniform. The aluminum and steel in the wire are joined by a strong, ductile metallurgical bond. The brittle intermetallic compounds which often occur when aluminum is applied to steel have been eliminated in this process. It is the elimination of these intermetallic compounds at the bond line which explains the ductility we have obtained."

AMU REPRESENTATIVES MEET

Representatives from the twenty-six educational and research institutions comprising the newly incorporated "Associated Midwest Universities" met last month at Argonne Laboratory's Lemont, Illinois site. Representing Battelle was Dr. Howard Russell.

The new organization's articles of incorporation list three main purposes:

1. To promote, encourage, and conduct research and education in all branches of science.
2. To establish means for facilitating the use of the Argonne National Laboratory and other laboratories by duly qualified personnel and students from the several cooperating institutions and other research and educational institutions.
3. To establish, maintain, and operate laboratories and other facilities as necessary for research and education.

Officers of AMU include Dr. James H. Jensen, provost of Iowa State College, as president; Dr. Laurence L. Quill of Michigan State as vice-president, and Dr. Joseph C. Boyce of Illinois Institute of Technology as secretary and acting treasurer.

"Our program envisages a continuing exchange among the staff of Argonne and the cooperating institutions, the cooperative use of facilities for research work, and the conduct by the universities of educational projects which are not directly a part of the Argonne mission (peacetime application of atomic energy) but which are of far-reaching national importance," Dr. Jensen reports.

According to Dr. Russell, it is anticipated that the new corporation will be a successor to the organization formerly known as Participating Institutions of Argonne National Laboratory.

AEC BRIEFS

A new series of publications, under the general title *Nuclear Technology Briefs—Reactor Materials*, is being issued by the Atomic Energy Commission. Through the *Briefs*, the AEC seeks to provide American science and industry with authoritative reports on important technological work as it emerges from research.

Just issued are briefs on "Niobium Technology" and "Plutonium—A Reactor Fuel". The former was prepared by William D. Klopp and the latter by Clyde R. Tipton, Jr. and Frank A. Rough, all of Battelle.

Klopp discusses both the advantages and disadvantages of niobium as a possible metal for use in reactors. He concludes: "If studies aimed at improving oxidation resistance are successful, the field of possible reactor application (for niobium) will be broadened. Such a development might even permit niobium to be considered for gas turbine applications".

Tipton and Rough view plutonium in the light of recent research and consider possible new methods for utilizing the metal. They state: "It is undoubtedly in the direction of alloy (both liquid and solid) that the real future of plutonium as a reactor fuel lies".

Writings by STAFF Members

Electrochemical Society, Journal, May, 1958, contains the following papers by staff members:

Vapor Pressure of Titanium Tetrabromide. Elton H. Hall, John M. Blocher, Jr., and Ivor E. Campbell, pp. 271-275.

Measurements were made of the vapor pressure of liquid $TiBr_4$. Combination of this data and thermal data with the calculated entropy of $TiBr_4(g)$ gave the standard entropy: $TiBr_4(s)$, $S°298.2 = 57.6 \pm 0.22$ e.u. This value agrees with Kelley's value 57.2 ± 0.9 e.u. obtained from low temperature heat-capacity measurements.

Vapor Pressure of Titanium Tetrafluoride. Elton H. Hall, John M. Blocher, Jr., and Ivor E. Campbell, pp. 275-278.

Measurements were made of the vapor pressure of solid TiF_4. Combination of this data and thermal data with the calculated entropy of TiF_4 (g), $S°298.2 = 73.2$ e.u., gave the standard entropy: TiF_4 (s), $S°298.2 = 31.3 \pm 0.40$ e.u.

Failure-Rate Studies on Silicon Rectifiers. N. F. Bechtold and C. L. Hanks. *Communication and Electronics*, 1958, no. 35, March, pp. 45-56.

Operating life capabilities of low-power silicon rectifiers are discussed to acquaint systems application engineers with the unexpectedly high failure rates related reliability factors demonstrated in a testing program aimed at evaluating these devices for stringent military application requirements.

A Component Case History: Information Storage Devices: A Key to Automation. I. Richard J. Bengston and Joseph E. Smith, Jr. *Computers and Automation*, v. 7, April 1958, pp. 11-13.

The development of information storage devices is reviewed and the market for electronic data processing is analyzed. The major criteria for such devices are access time, capacity, reliability, cost, sensitivity to environmental factors, and permanence. (To be continued.)

The Metallurgy and Fabrication of Uranium-Alloy Fuel Elements. R. W. Dayton. Paper from "Fuel Elements Conference, Paris, November 18-23, 1957". U. S. Atomic Energy Commission, TID-7546 (Book I) March 1958, pp. 302-365.

The alloys considered are Zr with 45 to 55 wt. % U, Zr with 20 wt. % U, U with 10 to 20 wt. % Mo or Nb, U with 5 wt. % Zr and 1.5 wt. % Nb, and U with 3.8 wt. % Si. Fabrication methods discussed are induction and arc melting for alloy preparation and brazing, roll bonding, and pressure bonding for cladding. Constitutional diagrams and properties are also included.

Tracer Studies of Fungicidal Action. R. W. Greenlee, R. S. Davidson, H. T. Kemp, and M. M. Baldwin. Engineers Joint Council, Nuclear Engineering & Science Conference Preprint 71, 1958, 29 pp.

Correlates the sorption uptake of compounds of equal inherent toxicity with differential fungicidal effects. Two homologous series of compounds ocntaining toxic moieties provided pairs which seemed suitable for a radiotracer sorption study of this relationship. The pairs chosen were (1) potassium dimethyldithiocarbamate and potassium di-n-propyldithiocarbamate and (2) N-n-butylethylenethiourea and N-n-propylethylenthiourea.

Members of the Battelle staff are authors of the recently published articles and books listed on these pages. In most cases, reprints are available from the Battelle Publications Office, 505 King Avenue, Columbus 1, Ohio.

Fatigue Crack Propagation in Severely Notched Bars. W. S. Hyler, E. D. Abraham, and H. J. Grover. *U .S. National Advisory Committee for Aeronautics, Technical Note 3685*, June 1956, 31 pp.

Fatigue tests were made in rotating bending on severely notched bars machined from 2024-T4 aluminum-alloy extruded round rods. Fatigue cracks initiated early in the lifetime of the severely notched specimens. Cracks in large-diameter specimens had a period of rapid crack growth followed by a marked tapering off in rate of crack propagation. This may be associated with compressive residual stresses.

Titanium Production Developments Including Metallurgy and Alloying. R. I. Jaffee. *North Atlantic Treaty Organization, AGARD Report No. 94*, April 1957, 89 pp.

The past, present, and future of the titanium industry is discussed in terms of costs and quantities of the metal produced. The nature and extent of present titaniu more reserves are described as are the relative merits and disadvantages of the present extractive metallurgical processes being used for primary metal production. Descriptions are given of the various methods in use for the melting, casting, and fabrication of titanium and its alloys. Techniques of descaling, finishing, joining, and machining are also reviewed. The physical, chemical, and mechanical properties of current commercial alloys are summarized. The principles applying to the physical metallurgy of titanium and its alloys are also described.

Self-Generated Oscillations in the D-C Carbon Arc. II. The Hissing Arc and Radio-Frequency Oscillations. Bernard H. List and T. B. Jones. Paper from "Electric Arc and Resistance Welding". **III.** pp. 209-217. 1952. American Institute of Electrical Engineers, New York.

The abrupt drop in voltage that occurs when the carbon arc begins to hiss in air, nitrogen, oxygen, or hydrogen appears to be a result of the change of mechanism of supplying positive ions at the anode. There is no abrupt drop in inert gases. With metallic electrodes, there is no drop in voltage because the ionization potential of the metal is lower than that of the product formed.

Thermal Properties of Thirteen Metals. C. F. Lucks and H. W. Deem. 29 pp. 1958. American Society for Testing Materials, Philadelphia, Pennsylvania.

Thermal-conductivity, linear-thermal-expansion, specific-heat, density, and thermal-diffusivity values are reported over the temperature ranges shown for the following metals: 2024-T4 and 7075-T6 aluminium from −250 to 800 F, Cr from 75 to 3000 F (thermal conductivity and diffusivity 400 to 1800 F), Cu from 75 to 1900 F (density from 75 to 3000 F), Inconel and Inconel "X" from −250 to 1800 F, AN-M-29 magnesium from −250 to 600 F, Mo from 75 to 3000 F (thermal conductivity and diffusivity from 400 to 1600 F), "K" monel from −250 to 1800 F, SAE 1010 steel from −250 to 1650 F, stainless steel types 301, 316, and 347 from −250 to 1800 F.

Transparent Electrically Conductive Coating. E. R. Olson and E. H. Lougher. *Electrical Manufacturing*, v. 61, March 1958, p. 143 + 4 pages.

A new procedure is described for depositing a highly transparent, electrically conductive coating that may be applied at low temperatures. Properties of the coatings may be controlled by varying proportions of the metals used, rate of evaporation, temperature, pressure, and oxygen content of the high-vacuum processing atmosphere.

Pulsations in Residential Gas Furnaces With Multiple-Port Burners. A. A. Putnam. *Heating, Piping & Air Conditioning*, v. 30, April 1958, pp. 143-149.

A logical basic mechanism of combustion-driven oscillations in furnaces equipped with multiple-port, slot, or ribbon burners is described. One factor involved is the time lag, and the manner in which it is affected by burner-port design, fuel, mixture ratio, and mixture flow rate. A second factor concerns the relative magnitude of driving and damping terms involved in determing the stable amplitude of oscillations.

Where to Use the New Semiconductor Materials. Robert K. Willardson and Theodore S. Shilliday. *Materials in Design Engineering*, v. 47, March 1958, pp. 114-118.

The properties of various binary semiconducting compounds are discussed in relation to present or potential applications in transistors, rectifiers, thermistors, and optical, galvanomagnetic, and thermoelectric devices.

WORLD-WIDE ABSTRACTS

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BATTELLE Technical Review ABSTRACTS

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***Asterisks mark items that may be used in the Battelle Library only. None of the unbound materials listed below are available for interlibrary loan.**

AERONAUTICAL ENGINEERING

9045 Star Sensors for Automatic Navigation. R. B. Horsfall. *Aviation Age*, v. 29, no. 4, Apr. 1958, p. 150 + 3 pages.

An analysis of the current status of development of hybrid stellar-inertial navigation systems needed for long range flight to overcome the problem of radiative contact with the earth.

9046* Aerophysical Problems of Flight at Extreme Altitudes and Speeds. III. Experimental Facilities and Techniques. G. N. Patterson. *Canadian Aeronautical Journal*, v. 4, no. 3, Mar. 1958, p. 79-85.

Hypersonic flight vehicles; ballistic ranges; low density wind tunnels; hypersonic wind tunnels; shock tubes.

9047 Solar Sailing—A Practical Method of Propulsion Within the Solar System. Richard L. Garwin. *Jet Propulsion*, v. 28, Mar. 1958, p. 188-190.

Commercially available metallized plastic film can be used as a solar radiation pressure sail for propulsion of space vehicles within the solar system. The method is of negligible cost and is perhaps more powerful than many competing schemes.

9048 Plasma Physics and Hypersonic Flight. J. W. Bond, Jr. *Jet Propulsion*, v. 28, Apr. 1958, p. 228-235.

Effects of the presence of free electrons in a hypersonic shock layer; shock front structure and boundary layer structure; differential plasma properties.

9049 Design, Fabrication and Testing of the Vanguard Satellite. Robert C. Baumann. *Jet Propulsion*, v. 28, Apr. 1958, p. 244-248.

9050 Hypersonic Flight and the Re-Entry Problem. H. Julian Allen. *Journal of the Aeronautical Sciences*, v. 25, Apr. 1958, p. 217 + 13 pages.

Performance of rocket vehicles; aerodynamic heating problems; aerodynamic loads; stability; flight efficiencies; new problems of hypervelocity vehicles.

9051 The Prospects for Magneto-Aerodynamics. E. L. Resler, Jr. and W. R. Sears. *Journal of the Aeronautical Sciences*, v. 25, Apr. 1958, p. 235 + 11 pages.

Electromagnetic effects may become important in aerodynamics, especially if seeding can be used to increase the conductivity of the air. Possibilities include decelerating re-entry missiles, controlling the skin friction and heat transfer in boundary layers, and accelerating or decelerating channel flows magneto-aerodynamically.

9052* (English.) **On the Effects of the Tunnel Wall Interference and the Wall Boundary Layer in the Airfoil Cascade Test.** Gorō Kamimoto. *Kyoto University. Memoirs of the Faculty of Engineering*, v. 19, no. 4, Oct. 1957, p. 351-373.

Theoretical calculation of wind tunnel interference in cascade tests under the assumption of two-dimensional potential flow; interference of the wall boundary layer upon the turning angle of flow in the cascade.

9053* Temperature Distributions in Aircraft Structures and the Influence of Mechanical and Physical Material Properties. K. L. C. Legg and G. Stevens. *Royal Aeronautical Society, Journal*, v. 62, Mar. 1958, p. 174-186.

Sources of heat on aircraft; temperature distribution in structures; mechanical and physical properties of airframe materials; typical structural combinations.

9054* A System for Handling Wind-Tunnel Data. J. F. M. Scholes. *Society of Instrument Technology, Transactions*, v. 10, no. 1, Mar. 1958, p. 20-30.

Details of automatic data-handling system.

9055 Approximations for the Thermodynamic and Transport Properties of High-Temperature Air. C. Frederick Hansen. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4150, Mar. 1958, 67 pp. (TL570 Un3t Vis.)

Compressibility, energy, entropy, specific heats, speed of sound, coefficients of viscosity and thermal conductivity, and Prandtl numbers for air are tabulated from 500 to 15,000 K in pressures from 0.0001 to 100 atm.

9056 Skin-Friction Measurements in Incompressible Flow. Donald W. Smith and John H. Walker. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4231, Mar. 1958, 67 pp. (TL570 Un3t Vis.)

Measurement of local surface-shear stress and the average skin-friction coefficient in incompressible flow for a turbulent boundary layer on a smooth flat plate having zero pressure gradient.

See also: **9433** (time response of linear systems); **9587** (chemical aeronomy); **9672** (advances in aerodynamics); **9805** (high temperature hemispherical emissivity of oxidized metals); **10107** (resin-glass laminates for missiles); **10193** (refrigeration for supersonic flight); **10200** (surface heat radiation).

AGRICULTURE

9057 Advances in Pest Control Research. R. L. Metcalf, editor. 314 pp. 1957. Interscience Publishers, New York. (SB 951 Ad95 Vis.)

A series of papers concerned with: control of health hazards associated with the use of pesticides; chemistry and mode of action of herbicides; mechanisms of fungitoxicity; repellents for biting arthropods; bioassay of pesticide residues.

9058* What's New in Pesticides? *Agricultural Chemicals*, v. 13, Apr. 1958, p. 30 + 7 pages.

Reports fifteen new insecticide-miticides, fungicides, herbicides, and defoliants.

9059 Atomic Energy in Agriculture. William E. Dick. 150 pp. 1957. Butterworths Scientific Publications, London. (S587 D55a)

A popular account of the subject including: remaking crop plants with radiation; tracing the path of carbon with radioisotopes; path of other elements; food preservation.

9060 Utility of Bioassay in the Determination of Pesticide Residues. J. E. Dewey. *Journal of Agricultural and Food Chemistry*, v. 6, Apr. 1958, p. 274-281.

Several organisms are in use. Selection depends on the pesticide used, reproducibility, indication of the true quantity of toxicant present, cost, speed of assay, and other practical limitations.

9061 Borosilicate Glass as a Continuing Source of Boron for Alfalfa. E. R. Holden and A. J. Engel. *Journal of Agricultural and Food Chemistry*, v. 6, Apr. 1958, p. 303-306.

Boron content of the crop was sustained in substantially the same range as that obtained with the newly placed glass in the first year. As application of glass was increased, boron removal by the crop in the two years ranged from 142 to 67% of estimated release in the first year alone.

9062 Separation of Bull Spermatozoa Carrying X- and Y-Chromosomes by Counter-Streaming Centrifugation. Per Eric Lindahl. *Nature*, v. 181, Mar. 15, 1958, p. 784.

9063 Effect on Earthworm and Diptera Populations of BHC Dust Applied to Soil. Jerzy J. Lipa. *Nature*, v. 181, Mar. 22, 1958, p. 863.

A curvilinear correlation (parabolic) exists between BHC concentration and the number of earthworms. The optimal γ-BHC concentration is 31.03 gm./100 m^2. This gives the highest number of earthworms.

9064* Resistance to Virus Y in the Potato. R. H. Bagnall and R. H. E. Bradley. *Phytopathology*, v. 48, Mar. 1958, p. 121-125.

Potato varieties that reacted with necrosis to a common strain of virus Y were resistant in the field under conditions in which varieties that usually developed symptoms of mosaic were relatively susceptible.

9065* Serological and Morphological Relationships Among Orchid Viruses. Harry H. Murakishi. *Phytopathology*, v. 48, Mar. 1958, p. 137-140.

9066* Growth Inhibition as a Mechanism in Dutch Elm Disease Therapy. Carl H. Beckman. *Phytopathology*, v. 48, Mar. 1958, p. 172-176.

9067* The Significance of Trace Elements in Agriculture. D. P. Cuthbertson and C. F. Mills. *Royal Institute of Chemistry, Journal*, v. 82, Mar. 1958, p. 151-164.

Indicates some of the soil-plant-animal interrelationships and where known, the loci of action of these elements.

See also: **9207** (value of soil testing); **9220** (analysis of lignin derived matter in soil); **10211** (durability of timber).

BIOCHEMISTRY AND BIOPHYSICS

9068 (English.) **Studies on the Circulation in Organic Systems With Applications to Indicator Methods.** Bengt Joel Andersson. *Acta Polytechnica (Physics Including Nucleonics Series)*, v. 3, no. 11, 1957, p. 1-19. (T1 Ac81 Vis.)

Theory for blood flow in actual circulation problems.

9069 Advances in Virus Research. Kenneth M. Smith and Max A. Lauffer, editors. v. V. 376 pp. 1958. Academic Press, New York. (QR360 Ad95)

A group of papers of interest in virus research concerned with: virus of foot-and-mouth disease; psittacosis-lymphogranuloma group; mating in the reproduction of bacterial viruses; lysogeny; hereditary virus of *Drosophila;* measurement of complement fixation by viruses; mechanism of hemagglutination by influenza virus.

9070* Mechanism of Hematopoiesis. Bernhard Steinberg. *AMA Archives of Pathology*, v. 65, Mar. 1958, p. 237-243.

9071* Cells of Human Heart and Aorta Grown in Tissue Culture. Estelle Fasolino Ingenito, John M. Craig, Jacqueline Labesse, Marthe Gautier, and David D. Rutstein. *AMA Archives of Pathology*, v. 65, Apr. 1958, p. 353-359.

Cultures of cells from human heart and aorta have been successfully grown and maintained in a medium containing human blood serum. Two techniques are described, one with and the other without a plasma clot. Standardized cultures are useful for *in vitro* experiments on rheumatic fever and atherosclerosis.

9072* Morphologic Effects of Serotonin (5-Hydroxytryptamine). Richard A. MacDonald, Stanley L. Robbins, and G. Kenneth Mallory. *AMA Archives of Pathology*, v. 65, Apr. 1958, p. 369-377.

The morphologic lesions that resulted in test animals consisted of dermal fibrosis, necrosis of the tip of the tail, necrosis of the tips of the digits, tubular and cortical necrosis of the kidneys, and opacities of the eyes. These changes may all have been due to a vasoconstrictive action of serotonin.

9073 Effect of 1-Phenyl-2-Hydrazinopropane, a Potent Monoamine Oxidase (MAO) Inhibitor, on Brain Levels of Norepinephrine and Serotonin. John H. Biel, Alexander E. Drukker, Parkhurst A. Shore, Sydney Spector, and Bernard B. Brodie. *American Chemical Society, Journal*, v. 80, Mar. 20, 1958, p. 1519.

Replacement of an amino group by a hydrazino moiety in amphetamine has yielded a compound which embodies the effects of amphetamine, but is in addition a very potent MAO inhibitor.

9074 Prognosis and Treatment of Multiple Sclerosis: Quantitative Nosometric Study. Leo Alexander, Austin W. Berkeley, and Alene M. Alexander. *American Medical Association, Journal*, v. 166, no. 16, Apr. 19, 1958, p. 1943-1949.

A statistical study.

9075 Modification of Rates of Gastrointestinal Absorption of Drugs. I. Amines. Chester J. Cavallito and Rosemary Jewell. **II. Quaternary Ammonium Salts.** Chester J. Cavallito and Thomas B. O'Dell. *American Pharmaceutical Association, Journal (Scientific Ed.)*, v. 47, Mar. 1958, p. 165-173.

9076* Smoking and Lung Cancer: Some Observations on Two Recent Reports. Joseph Berkson. *American Statistical Association, Journal*, v. 53, no. 281, Mar. 1958, p. 28-38.

9077* The Utility of the Rous Sarcoma Virus for Detection of Antiviral Activity. Irving S. Johnson and Linville A. Baker. *Antibiotics & Chemotherapy*, v. 8, Mar. 1958, p. 113-121.

9078* (English.) **N,O-Peptidyl Shift in Ribonuclease Causing Reversible Enzymatic Inactivation.** Lars Josefsson. *Arkiv för Kemi*, v. 12, no. 2, 1958, p. 183-193.

Anhydrous formic acid induces an N,O-acyl migration at the hydroxyamino acid residues of ribonuclease. The shift is completely reversed in aqueous solution near neutrality. Moreover, the migration is accompanied by a reversible loss of the enzymatic activity.

9079 Bacterial Fermentations. H. A. Barker. 95 pp. 1956. John Wiley & Sons, Inc., New York. (QP601 B24b)

A CIBA lecture series: biological formation of methane; chemistry of butyric acid-butanol fermentations; fermentations of nitrogenous compounds.

9080* Tissue Culture Nutrition. Joseph F. Morgan. *Bacteriological Reviews*, v. 22, no. 1, Mar. 1958, p. 20-45.

Deals with the application of bacteriological techniques to problems in tissue cell nutrition.

9081* The Extracellular Polysaccharides of Bacteria. J. F. Wilkinson. *Bacteriological Reviews*, v. 22, no. 1, Mar. 1958, p. 46-73.

A review concerned with morphological localization; chemistry and antigenicity; formation by intact cells; metabolism; and functions.

9082 Biochemical Preparations. David Shemin, editor. v. V. 115 pp. 1957. John Wiley & Sons, New York. (QP509 B52p Vis.)

A compilation of papers describing methods of synthesis and properties of new compounds with biochemical research interest, such as: aldolase, S-benzyl-DL-homocysteine, and 2 deoxy-D-ribose.

9083 (English.) **Ribonucleases of Rat Liver. I. Partial Purification and Properties.** Jean Zytko, Gaston De Lamirande, Claude Allard, and Antonio Cantero. *Biochimica et Biophysica Acta*, v. 27, no. 3, Mar. 1958, p. 495-503.

Methods for the purification of both the acid and alkaline ribonucleases of rat liver are reported. It was possible to obtain a purified alkaline ribonuclease freed from acid ribonuclease acitivity. Some characteristics of both enzymes are reported. Preliminary results on the specificity of these enzymes showed that acid RNAase splits cyclic mononucleotides (purine or pyrimidine) whereas alkaline RNAase does not.

9084 (English.) **A Method for the Separation of Nucleotides by Concave Gradient Elution.** Horacio G. Pontis and Nigel L. Blumsom. *Biochimica et Biophysica Acta*, v. 27, no. 3, Mar. 1958, p. 618-624.

A method is presented for the separation of nucleotides on ion-exchange resin, by concave gradient elution. An almost quantitative procedure for the recovery of the nucleotides in the effluents is described.

9085 (English.) **The Incorporation of ^{14}C-Deoxynucleotides Into Deoxyribonucleic Acid by Soluble Mammalian Enzymes.** R. Mantsavinos and E. S. Canellakis. *Biochimica et Biophysica Acta*, v. 27, no. 3, Mar. 1958, p. 661-662.

Incorporation of deoxynucleotides into DNA occurs in the soluble supernatant fraction of rat liver homogenate. Addition of rat-liver DNA to the incubation mixture increases the incorporation. An increased incorporation is observed when all four nucleotides are present in the incubation mixture, and addition of an extract of regenerating rat-liver nuclei stimulates the incorporation.

9086* (English.) **The Conservation of Ribonucleic Acid by Ehrlich Ascites Tumor Cells.** Jesse F. Scott and Edgar B. Taft. *Biochimica et Biophysica Acta*, v. 28, no. 1, Apr. 1958, p. 45-50.

Essentially all of the ^{14}C of orotic acid-6-^{14}C incorporated into the pyrimidines of RNA and DNA of Ehrlich mouse ascites tumor cells (hyperdiploid and tetraploid lines) is retained for periods of 7-10 days *in vivo* during which the cells are increasing six-fold in number at a logarithmic rate.

9087* (English.) **Phosphorolysis of Leaf Ribonucleic Acids.** Peter Lengyel and Severo Ochoa. *Biochimica et Biophysica Acta*, v. 28, no. 1, Apr. 1958, p. 200-201.

Base composition of RNA from tobacco and spinach leaves differs from that of tobacco-mosaic-virus RNA.

9088* The Nature and Significance of Megaloblastic Blood Formation. Edward H. Reisner, Jr. *Blood*, v. 13, Apr. 1958, p. 313-338.

Proposes that megaloblasts are red blood cell precursors with a prolonged resting phase between mitoses, allowing a longer time for dispersion of the chromatin throughout the nucleus.

9089* Antibody Responses to British Poliomyelitis Vaccine of Children With Naturally Occurring Antibody. Kate Russell. *British Medical Journal*, no. 5071, Mar. 15, 1958, p. 622-624.

The results indicated that children with pre-existing heterologous antibody may show an increased response to a given type, while those with pre-existing homologous antibody give a "booster" response.

9090 Detoxication Mechanisms. The Metabolism of Drugs and Allied Organic Compounds. R. Tecwyn Williams. 2nd Ed. 288 pp. 1949. John Wiley & Sons, New York. (RS410 W67d)

A text concerned with metabolism of various systems such as: aromatic hydrocarbons, phenols, organic cyanides, terpenes and camphors, and heterocyclic compounds.

9091 Tracer Studies of Fungicidal Action. R. W. Greenlee, R. S. Davidson, H. T. Kemp, and M. M. Baldwin. *Engineers Joint Council, Nuclear Engineering & Science Conference Preprint* 71, 1958, 29 pp. (TK9006 En34p Vis.)

Correlates the sorption uptake of compounds of equal inherent toxicity with differential fungicidal effects. Two homologous series of compounds containing toxic moieties provided pairs which seemed suitable for a radiotracer sorption study of this relationship. The pairs chosen were potassium dimethyldithiocarbamate and potassium di-n-propyldithiocarbamate and N-n-butylethylenethiourea and N-n-propylethylenethiourea.

9092 Measurement of Bioelectric Potentials With Microelectrodes and Neutralized Input Capacity Amplifiers. Ernest Amatniek. *IRE Transactions on Medical Electronics, PGME-10*, Mar. 1958, p. 3-14. (TK1 In6.6m Vis.)

The biological aspects of bioelectric potentials are reviewed, equivalent electric circuits of the bioelectric generator derived, and grid current magnitude deleterious to a living cell evaluated.

9093* Occurrence of Methylated Purine Bases in Yeast Ribonucleic Acid. Max Adler, Bernard Weissmann, and Alexander B. Gutman. *Journal of Biological Chemistry*, v. 230, no. 2, Feb. 1958, p. 717-723.

Substances were identified by spectrophotometric and chromatographic comparisons with authentic specimens. The N^6-methyladenine constituted 0.1% of the purine content of the specimen examined. Each of the methylated guanines was present in about one-tenth this amount.

9094* Subtle Interactions of Cupric Ion With Nucleic Acid and Components. Earl Frieden and Jeanne Alles. *Journal of Biological Chemistry*, v. 230, no. 2, Feb. 1958, p. 797-804.

The relative effectiveness of cupric ion chelation was: purine > purine nucleotide = RNA-DNA > purine nucleoside > pyrimidine nucleotide. The deoxyribose derivatives were uniformly stronger cupric ion chelators. The structure of these chelates and their possible biological significance are briefly discussed.

9095* Mechanism of Protein Turnover Studied With Cystine-S^{35}, Lysine-C^{14} Doubly Labeled Plasma Proteins of the Dog. Patrick D. Goldsworthy and Wade Volwiler. *Journal of Biological Chemistry*, v. 230, no. 2, Feb. 1958, p. 817-831.

The data appear to support the occurrence of complete protein degradation as a mechanism of protein turnover.

9096* The Utilization of Glutamine, Glutamic Acid, and Ammonia for the Biosynthesis of Nucleic Acid Bases in Mammalian Cell Cultures. Norman P. Salzman, Harry Eagle, and Edwin D. Sebring. *Journal of Biological Chemistry*, v. 230, no. 2, Feb. 1958, p. 1001-1012.

In cell cultures of a human uterine carcinoma, strain HeLa (4), two of the ring nitrogens of the purines, one of the pyrimidine ring nitrogens, and the amino groups of both guanine and cytosine are shown to be derived from the amide nitrogen of glutamine.

9097* Electron Microscope Study of a Cell-Free Induced Leukemia of the Mouse: A Preliminary Report. Étienne de Harven and Charlotte Friend. *Journal of Biophysical and Biochemical Cytology*, v. 4, no. 2, Mar. 1958, p. 151-156 + 9 plates.

9098* The Use of Carbon Films in the Culture of Tissue Cells for Electron Microscopy. Maurice C. Davies and R. Wallace. *Journal of Biophysical and Biochemical Cytology*, v. 4, no. 2, Mar. 1958, p. 231-232 + 1 plate.

9099* The Reversible and Irreversible Toxic Effects of AntiHeLa Cell Rabbit Serum Upon Human Cell Lines in Tissue Culture. Gerald Goldstein and Quentin N. Myrvik. *Journal of Immunology*, v. 80, no. 2, Feb. 1958, p. 100-105.

Anti-HeLa cell rabbit serum produces both irreversible cytotoxic changes reported by previous investigators, and reversible cytotoxic effects not previously reported.

9100* Symposium on Amino Acid Activation. *National Academy of Sciences, Proceedings*, v. 44, Feb. 1958, p. 67-104.

9101* On Resonance Transfer of Excitation Energy Between Aromatic Aminoacids in Proteins. George Karreman, Richard H. Steele, and Albert Szent-Györgyi. *National Academy of Sciences, Proceedings*, v. 44, Feb. 1958, p. 140-143.

Critical distances, R_o, have been calculated for the resonance transfer of singlet excitation energy between the aromatic amino acids phenylalanine, tyrosine, and tryptophane and between these amino acids and the coenzymes reduced diphosphopyridine nucleotide and oxidized riboflavin.

9102* The Dependence of Pneumococcal Transformation on the Molecular Weight of Deoxyribose Nucleic Acid. Michael Litt, Julius Marmur, Harriett Ephrussi-Taylor, and Paul Doty. *National Academy of Sciences, Proceedings*, v. 44, Feb. 1958, p. 144-152.

The critical mol. wt. was found to be one million.

9103* A Probable Mechanism of Action of Serotonin. D. W. Woolley. *National Academy of Sciences, Proceedings*, v. 44, Feb. 1958, p. 197-201.

Presents evidence that serotonin exerts its physiological effects by carrying calcium ions across the membrane into animal cells.

9104* Early Unstable CO_2 Fixation Products in Photosynthesis. Helmut Metzner, Barbara Metzner, and Melvin Calvin. *National Academy of Sciences, Proceedings*, v. 44, Feb. 1958, p. 205-211.

Some chemical, physical, and chromatographic properties of the hydroxylamine-stabilized early products of CO_2 fixation in photosynthesis are described.

9105* Concerning the Origin of Bacterial Viruses. John H. Northrop. *National Academy of Sciences, Proceedings*, v. 44, Mar. 1958, p. 229-235.

Results suggest that change from a normal to a phage-producing cell is a mutation.

9106 Relation Between Nucleolar Volume and Cell Body Content of Ribonucleic Acid in Supra-Optic Neurones. J.-E. Edström and D. Eichner. *Nature*, v. 181, Mar. 1, 1958, p. 619.

It was found that the ribonucleic acid content per cell body was directly proportional to the nucleolar volume. The ribonucleic acid content per cell body nearly equals that of the cytoplasm in these cells, so it is apparent that there is a proportionality between nucleolar volume and cytoplasmic content of ribonucleic acid.

9107 A Special Reaction of the Complement Fixation Test Applied to the Study of Tumours. A. Serra, G. Guarini, P. Lovisetto, D. Castelli, and F. Balzola. *Nature*, v. 181, Mar. 1, 1958, p. 622-623.

Foot and mouth disease virus can act as an antigen in a special reaction of the complement fixation test. Normal subjects usually give a positive serological reaction while most subjects with tumors give a negative reaction.

9108 Multiple-Mutation Theory of Carcinogenesis. J. C. Fisher. *Nature*, v. 181, Mar. 1, 1958, p. 651-652.

Proposes a model based on three successive somatic mutations as being in fair agreement with the incidence rates of certain human tumor types.

9109 Coding Problem in Proteins. Drew Schwartz. *Nature* v. 181, Mar. 15, 1958, p. 769.

Non-randomness in the arrangement of some aromatic amino-acids offers support for a coding system, although the lack of conformation of phenylalanine is a serious obstacle.

9110 Structural Differentiation in the Nucleoid of Mature Vaccinia Virus. M. A. Epstein. *Nature*, v. 181, Mar. 15, 1958, p. 784-785.

9111 Survival Curves for Male and Female House-Flies (Musca domestica L.). Morris Rockstein and Harry M. Lieberman. *Nature*, v. 181, Mar. 15, 1958, p. 787-788.

About 90% of the males die between 10 and 30 days of age, whereas the females die off to the same extent between 10 and 50 days of adult life.

9112 Ribonuclease Activity and Ribonucleic Acid Content of Homologous Human Normal and Cancer Cells. L. Ledoux and S. Brändli. *Nature*, v. 181, Mar. 29, 1958, p. 913-914.

For the same ribonucleic acid/protein ratio in normal and cancer cells, the ribonuclease activity/protein ratio is lower in cancer cells.

9113 The Latent Period After Infection With Tobacco Mosaic Virus and Virus Nucleic Acid. G. Schramm and R. Engler. *Nature*, v. 181, Mar. 29, 1958, p. 916-917.

9114 Chemotherapeutic Action of a Cyclic Nitrogen Mustard Phosphamide Ester (B 518-ASTA) in Experimental Tumours of the Rat. Herbert Arnold, Friedrich Bourseaux, and Norbert Brock. *Nature*, v. 181, Mar. 29, 1958, p. 931.

9115 Kinetics of Heat Inactivation of Ribonucleic Acid of Tobacco Mosaic Virus. William Ginoza. *Nature*, v. 181, Apr. 5, 1958, p. 958-961.

9116 The Chromatographic Examination of Oils With Dyed Filter Paper. D. W. Poxon. *Oil & Colour Chemists' Association, Journal*, v. 41, Apr. 1958, p. 291-300.

By means of filter paper dyed with suitable dyestuffs and cut to a specific shape, it has been found possible to obtain characteristic chromatograms for the essential and fixed oils and to develop a technique whereby the aging properties of any sample of a fixed oil may be assessed in terms of an easily measurable index coupled with characteristic chromatogram features.

9117* Some Simplified Mathematical Treatments of Translocation in Plants. Leonard Horwitz. *Plant Physiology*, v. 33, no. 2, Mar. 1958, p. 81-93.

The consequences of a number of simple theories of translocation have been derived mathematically in order to see which of these theories are plausible and conform to experimental observations.

9118* The Effects of Light Intensity on the Growth Rates of Green Algae. Constantine Sorokin and Robert W. Krauss. *Plant Physiology*, v. 33, no. 2, Mar. 1958, p. 109-113.

The growth rates of five green algae were determined under light intensities up to 10,000 ft-c. The intensities at which saturation was developed varied from 250 ft-c for *Chlorella vulgaris* to 500 ft-c for other species at 25 C.

9119* The Effect of a Single Systemic X-Irradiation of the C57BL Mouse on the Nucleodepolymerases of the Thymus. Patricia P. Weymouth. *Radiation Research*, v. 8, no. 4, Apr. 1958, p. 307-321.

Reversible increases were found in three nucleodepolymerases: DNase, RNase 6, and RNase 8.

9120* Effects of Ionizing Radiation on Cross-Reactivation of Tl Bacteriophage. J. E. Till and E. C. Pollard. *Radiation Research*, v. 8, no. 4, Apr. 1958, p. 344-360.

Cross-reactivation has been shown to occur for mutants of Tl bacteriophage that have been inactivated by exposure in the dry state to various kinds of ionizing radiation. Of the material associated with the ability to multiply independently, 60% is involved in the cross-reactivation process.

9121* A Discussion on the Cytoplasm in Variation and Development. D. G. Catcheside. *Royal Society, Proceedings*, v. 148, ser. B, Mar. 18, 1958, p. 285-369.

A collection of ten papers on current research interests in this field. Topics include cytoplasmic fine-structure; antigen determination; differentiation; protein and nucleic acid synthesis; and inheritance.

9122* Leeuwenhoek Lecture. Virus-Host Cell Interactions. Wilson Smith. *Royal Society, Proceedings*, v. 148, ser. B, Mar. 18, 1958, p. 370-384.

9123* Studies in Enzyme Cytochemistry. I. Principles of Cytochemical Staining Methods. S. J. Holt and D. G. O'Sullivan. **II. Synthesis of Indigogenic Substrates for Esterases.** S. J. Holt and P. W. Sadler. **III. Relationships Between Solubility Molecular Association and Structure in Indigoid Dyes.** S. J. Holt and P. W. Sadler. **IV. Kinetics of Aerial Oxidation of Indoxyl and Some of Its Halogen Derivatives.** S. Cotson and S. J. Holt. **V. An Appraisal of Indigogenic Reactions for Esterase Localization.** S. J. Holt and R. F. J. Withers. *Royal Society, Proceedings*, v. 148, ser. B, Apr. 8, 1958, p. 465-532 + 2 plates.

9124 Synthesis in the Study of Nucleotides. Alexander Todd. *Science*, v. 127, Apr. 11, 1958, p. 787-792.

Historical review of advances in understanding the structures and roles of naturally occurring nucleotides.

9125 Mammalian Viruses and Rickettsiae. Bill H. Hoyer, et al. *Science*, v. 127, Apr. 18, 1958, p. 859-863.

Techniques of column chromatography with cellulose ion exchange have been successfully applied to mammalian viruses and rickettsiae. Recovery of virus is excellent, and appreciable purification in terms of phosphorus and protein removal has been demonstrated.

9126* Mechanisms of Trace Element Function. George K. Davis. *Soil Science*, v. 85, no. 2, Feb. 1958, p. 59-62.

Aspects of element interaction which appear to be of considerable importance in animal nutrition and feeding.

9127* Formation of Myelin Forms in Brain Tissue. William W. Ayres. *U. S. Armed Forces Medical Journal*, v. 9, Apr. 1958, p. 507-531.

The addition of a synthetic surface-active agent, dioctyl sodium sulfosuccinate, to unfixed human and guinea pig brain tissue causes the development of myelin forms, cholesterol crystals, and tyrosine crystals *in vitro*. The surface-active agent releases lecithin from cerebral lipoprotein which in the presence of water develops into myelin forms.

9128 A New Apparatus for Tracer Studies of Photosynthesis. V. Moses. *U. S. Atomic Energy Commission UCRL*-8141, Dec. 20, 1957, p. 17-21. (UF767 Un3 Contin.)

Description of apparatus using tritium oxide. Test results were more reproducible than in experiments performed by the flattened-test-tube method.

9129* Effects of Certain Amino Acid Derivatives on Microorganisms and Sarcoma 180. M. N. Mickelson and Reid S. Flippin. *U. S. National Cancer Institute, Journal*, v. 20, no. 3, Mar. 1958, p. 495-512.

9130* Immunogenetic Properties of Tumors That Have Acquired Homotransplantability. Michael Feldman and Leo Sachs. *U. S. National Cancer Institute, Journal*, v. 20, no. 3, Mar. 1958, p. 513-538 + 1 plate.

Analysis of the agglutinogen constitution, the agglutinin response to tumor homografts, the nature of the homograft reaction, the formation of metastases, and the morphology of the chromosomes.

9131* The Sex-Linked Histocompatibility Antigens. Leo Sachs and Emanuel Heller. *U. S. National Cancer Institute, Journal*, v. 20, no. 3, Mar. 1958, p. 555-561.

Male-to-female skin grafts were rejected 100% in 6 strains of mice (A/Jax, BALB/c, BRS, C3H, C57BL, and DBA/2) that were tested, whereas, skin grafs involving other sex combinations were successful. The presence of sex-linked histocompatibility antigens seems to be a general phenomenon. In addition to skin, the antigens are present in other tissues such as liver and spleen.

9132* Topical Antitumoral Effects of Cortisol, as Demonstrated by the "Double Granuloma-Pouch" Technique. Hans Selye. *U. S. National Cancer Institute, Journal*, v. 20, no. 3, Mar. 1958, p. 581-585 + 2 plates.

If two "granuloma pouches" are produced in the same rat and cortisol acetate (COL-Ac) is injected into one of them, a marked antitumoral effect is manifest only in the pouch into which the hormone is introduced. It is concluded that glucocorticoids, such as COL-Ac, inhibit the growth of neoplastic tissue directly by virtue of local effects and not through the intermediary of systemic metabolic actions.

9133* Genetic Factors Influencing Irradiation Protection by Bone Marrow. II. The Histocompatibility-2 (*H*-2) Locus. Delta E. Uphoff and L. W. Law. *U. S. National Cancer Institute, Journal*, v. 20, no. 3, Mar. 1958, p. 617-624.

It has been shown, by employing coisogenic lines of mice differing at *H*-2 locus, that the survival pattern, following lethal total-body X-irradiation and grafting of coisologous marrow, is similar to that obtained through the use of homologous or heterologous marrow. Thus, differences in a single histocompatibility gene (H-2) provide sufficient basis for the severe reaction of the secondary phase.

9134* Preclusion of Secondary Phase of Irradiation Syndrome by Inoculation of Fetal Hematopoietic Tissue Following Lethal Total-Body X Irradiation. Delta E. Uphoff. *U. S. National Cancer Institute, Journal*, v. 20, no. 3, Mar. 1958, p. 625-632.

The secondary phase of the irradiation syndrome has been successfully precluded by the use of fetal hematopoietic tissue inoculation following lethal total-body X irradiation.

See also: **9183** (continous freeze-drying process); **9217** (assay of serotonin in tissue); **9276** (polyacetylenic antibiotics); **9278** (tumor inhibitors from diazomethane); **9297** (24- and 25-dehydrocholesterol); **9426** (artificial heart control); **9633** (laboratory freeze-drying equipment); **9650** (constant delivery pump for biological solutions); **9941** (biological fast-neutron dosimeter).

CERAMICS AND CONCRETE

9135* (Russian.) Effect of Anistropy on Creep Deformation of Concrete. **Vliianie anizotropii na deformatsii polzuchesti betona.** K. S. Karapetian. *Akademiia Nauk Armianskoi SSR, Izvestiia. Seriia Fiziko-Matematicheskikh Nauk*, v. 10, no. 6, 1957, p. 59-74.

Effect of anisotropy on creep and on deformability of concrete under short time loading and during setting.

9136 (Russian.) "Pyrexyl", Heat Resistant Glass. **Termostoikie stekla "pireksil".** I. I. Kitaigorodskii and V. A. Blinov. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 2, Jan. 11, 1958, p. 351-353.

A series of experiments in the preparation of new glass initially using "pyrex" type borosilicate glass and with a sequential substitution of B_2O_3 by SiO_2.

9137 Crystal Habit of Alpha Alumina in Alumina Ceramics. H. N. Baumann, Jr. *American Ceramic Society Bulletin*, v. 37, Apr. 1958, p. 179-184.

The primary crystallization of α alumina crystals tends to be equant and euhedral rhombohedra. Under many conditions, tabular habit phenocrysts develop and exhibit more or less rhombohedral and pinacoidal faces.

9138 A Thermal Expansion Apparatus With a Silicon Carbide Dilatometer for Temperatures to 1500°C. Stanley D. Mark, Jr. and Roger C. Emanuelson. *American Ceramic Society, Bulletin*, v. 37, Apr. 1958, p. 193-196.

Construction, operation, and verification of apparatus; calibration data.

9139 Thoria-Urania Bodies and Irradiation Studies. C. L. Hoenig, J. H. Handwerk, J. H. Kittel, and C. R. Breden. *American Ceramic Society, Journal*, v. 41, Apr. 1958, p. 117-123.

Irradiation tests in NaK and in water indicated that ThO_2-UO_2 solid-solution bodies apparently are suitable for use as fuels in boiling-water reactors.

9140 Crystal Chemistry of Hydrous Calcium Silicates. III. Morphology and Other Properties of Tobermorite and Related Phases. G. L. Kalousek and Albert F. Prebus. *American Ceramic Society, Journal*, v. 41, Apr. 1958, p. 124-132.

9141* Creep of Concrete Under Variable Stress. A. D. Ross. *American Concrete Institute, Journal*, v. 29, no. 9, Mar. 1958; *ACI Proceedings*, v. 54, 1958, p. 739-758.

Three methods for computing creep under variable stress from results under constant stress.

9142 Development of Ceramic Insulating Materials for High-Temperature Use. W. D. Kingery, J. D. Klein, and M. C. McQuarrie. *ASME, Transactions*, v. 80, no. 3, Apr. 1958, p. 705-710.

Factors affecting the thermal conductivity of ceramics in the temperature range 2200-4000 F are considered from the point of view of high-temperature insulation. The effective conductivity of solids and pores over a wide range of temperatures is analyzed.

9143* The Thickening of Slurries of Gypsum Plaster. D. A. Powell. *Australian Journal of Applied Science*, v. 9, no. 1, Mar. 1958, p. 24-35.

The percentage of hemihydrate converted to gypsum during the initial setting period depends upon the consistency of the plaster slurry and on the crystal habit of the gypsum formed, indicating that formation of gypsum crystals is the main cause of initial thickening.

9144* Studies in Cement-Aggregate Reaction. XXVI. Comparison of the Effect of Soda and Potash on Expansion. C. E. S. Davis. *Australian Journal of Applied Science*, v. 9, no. 1, Mar. 1958, p. 52-62.

The effects of four sources of alkali-KOH in mixing water, potash in cement minerals, NaOH in mixing water, and soda in cement minerals were compared in opaline mortar bars.

9145* (Russian.) The Ultrasonic Impulse Method for Controlling the Quality of Concrete. **Ul'trazvukovoi impul'snyi metod kontrolia kachestva betona.** A. Savchuk and A. Filipchinski. *Beton i Zhelezobeton*, 1958, no. 2, Feb., p. 45-52.

9146* (Russian.) Optimal Additions of Sodium Chloride in Concrete Mixtures Used for Paving Roads Below Freezing. **Optimal'nye dobavki khloristykh solei k betonnym smesiam, ukladyvaemym v dorozhnye pokrytiia pri otritsatel'nykh temperaturakh.** V. I. Ovcharov. *Beton i Zhelezobeton*. 1958, no. 2, Feb., p. 55-60.

9147* (Russian.) Effect of the Quantitative Addition of Tripoli on the Frost Resistance of Concrete. **Vliianie kolichestva dobavki trepela na morozostoikost' betona.** V. M. Moskvin, S. N. Alekseev, and V. G. Batrakov. *Beton i Zhelezobeton*, 1958, no. 2, Feb., p. 60-62.

The structure of the cement rock in concrete can be improved, density and durability of concrete increased, and its permeability reduced if a fine-ground hydraulic admixture is added to this concrete.

9148 Observations on Thermal Transformations in Alumina. D. J. Stirland, A. G. Thomas, and N. C. Moore. *British Ceramic Society, Transactions*, v. 57, Feb. 1958, p. 69-84 + 4 plates.

Electron diffraction and electron microscope techniques were used to study some of the alumina phases encountered in the thermal decomposition of hydrated aluminum chloride.

9149 Relationships Between Constitution and Properties of Silica Refractories. II. The Constitution of Silica Refractories Before and After Heat Treatment. III. Effect of Heat Treatment on the Mechanical Properties. A. C. D. Chaklader and A. L. Roberts. *British Ceramic Society, Transactions*, v. 57, Mar. 1958, p. 115-147.

9150 Taking the Black Magic Out of High-Temperature Nonmetallics. Roy W. Brown. *Chemical Engineering*, v. 65, Apr. 21, 1958, p. 135-150.

Engineering characteristics and process uses of construction materials that work best between 1500 and 3500 F.

9151 Glass-to-Metal Seals. Jacque Comer. *Electrical Manufacturing*, v. 61, Mar. 1958, p. 110 + 5 pages.

Developments in glass-to-metal seals for electrical and electronic components. Application data for available designs in compression and matched seals. Characteristics, performance capabilities, and limitations.

9152 Glass: Its Transparency and Structure. II. Transparent Colors, Surface and Optical Effects, Presence of Particles, and Transparency. III. Transparency and Structure of Liquids and Glasses. H. H. Holscher. *Glass Industry*, v. 39, Mar. 1958, p. 143-150; Apr. 1958, p. 212 + 10 pages.

9153 Spectra of Simple Glasses in the Infrared Range and Their Relations to the Structure of Glass. III. V. A. Florinskaya and R. S. Pechenkina. *Glass Industry*, v. 39, Mar. 1958, p. 151 + 4 pages.

(Translated from the Russian by Wilhelm Eitel.)

9154 Use of X-Ray Methods for Investigations of Glass Structures. Kai Grjotheim. *Glass Industry*, v. 39, Apr. 1958, p. 201-209.

Different sources of error are stressed. It is concluded that the power of the X-ray method in its present state of development is overestimated.

9155* The Effect of Small Additions of Magnesia on Some High-Permittivity Ceramics Based on Barium Titanate. K. W. Plessner and R. West. *Journal of Electronics and Control*, v. 4, no. 1, Jan. 1958, p. 51-57.

The presence of MgO in $BaTiO_3$ and its solid solutions (such as with $CaZrO_3$ or $CaSnO_3$) greatly improves the sintering of the ceramic and the pore space being reduced to about 1% in some cases. The permittivity maximum is flattened and displaced to lower temperatures by about 70 C for 0.5% MgO.

9156* (Russian.) Linear Alterations of Ceramic Structures During Heating and Cooling. **Lineinye izmeneniia keramicheckikh form pri nagreve i okhlazhdenii.** O. V. Stupishina. *Liteĭnoe Proizvodstvo*, 1958, no. 2, Feb., p. 20-23.

9157* (Russian.) Life of High-Alumina-Clay Checker Brick in Open-Hearth Regenerators. **Sluzhba vysokoglinozemistogo kirpicha v nasadkakh regeneratorov martenovskikh pechei.** V. A. Rybnikov, E. A. Volynskii, and G. V. Vodop'ianov. *Ogneupory*, v. 23, no. 3, 1958, p. 109-111.

9158* The Role of Sulphur Trioxide in Burning—Its Influence on Cement Quality. A. Stikker. *Pit and Quarry*, v. 50, no. 9, Mar. 1958, p. 132 + 3 pages.

9159* (English.) **Structural Aspects of Solid-Phase Sintering, Especially of Oxides.** Roman Pampuch. *Silicates Industriels*, v. 23, no. 3, Mar. 1958, p. 119-124.

Small compacts of 99.6% Al_2O_3 and other oxides were heated to various temperatures. The progress of sintering was followed by means of a microscope. Sudden decreases in size of the specimens were observed which are interpreted as the start of the sintering process. These temperatures are well below those required to obtain a dense structure.

9160* (French.) A Contribution to the Study of Thermal Shock Resistance. **Contribution à l'étude de la résistance au choc thermique.** Hector Detaille. *Silicates Industriels*, v. 23, no. 3, Mar. 1958, p. 131-136.

Physical properties and the appearance of internal stresses inside a ceramic material; mechanical properties enabling the material to resist thermal shock. Testing silico-alumina and silica bricks.

9161 (Russian.) Porcelain Glazes Wtih Various Types of Silica. **Farforovye glazuri s razlichnymi formami kremnezema.** Iu. G. Shteinberg and L. N. Nikulina. *Steklo i Keramika*, v. 15, no. 2, Feb. 1958, p. 14-18.

A new method for producing glazes containing no feldspar and requiring no increase in annealing temperature.

9162 (Russian.) Chemical Polishing of Crystal Ware. **Khimicheskaia polirovka khrustal'nykh izdelii.** M. M. Skorniakov. *Steklo i Keramika* v. 15, no. 2, Feb. 1958, p. 18-20.

Optimum composition of HF and HNO_3 for polishing different glasses.

9163 (Russian.) The Use of Rare-Metal Preparations in the Glass Industry. **Primenenie v stekol'noi promyshlennosti preparatov redkikh zemel'.** K. T. Bondarev and V. A. Dubrovskii. *Steklo i Keramika*, v. 15, no. 2, Feb. 1958, p. 21-24.

Cerium dioxide preparations containing some La_2O_3, Nd_2O_3, Pr_2O_3, and other rare-earth oxides, were investigated as to their ability to decolorize various types of glasses.

9164* (Russian.) New Method for Selection of Refractory Material for the Glass Industry. **Novyi metod podbora ogneuporov k steklu.** V. G. Dunaev and A. A. Litvakovskii. *Steklo i Keramika*, v. 15, no. 3, Mar. 1958, p. 13-16.

Platinum electrodes, coated with a slurry of the refractory body and immersed in molten glass, the deterioration degree of the refractory by the current generated.

9165* (Russian.) Polishing Glass With Ultrasound. **Shlifovka stekla s pomoshch'iu ul'trazvuka.** G. K. Demishev and A. I. Kolbasnikova. *Steklo i Keramika*, v. 15, no. 3, Mar. 1958, p. 25-29.

Describes instrument and methods for laboratory investigation.

9166 (Russian.) Magnetic Superviscosity of Ferrites. **O magnitnoi sverkhviazkosti ferritov.** R. V. Telesnin and E. V. Karchagina. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*, v. 34, no. 1, Jan. 1958, p. 23-28.

Study of the course of the magnetic superviscosity curves of Ni-Zn ferrites (16 mol. % NiO, 34 mol. % ZnO, the rest Fe_2O_3 at 78 K. Sintering six specimens at various temperatures between 1200 and 1400 C for 4 hr. with preliminary heating at 1000 C.

9167* (Russian.) Phase Transistions in Certain Solid Solutions Containing Lead Zirconate. **Fazovye perekhody v nekotorykh tverdykh rastvorakh soderzhashchikh tsirkonat svintsa.** N. N. Krainik. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 3, Mar. 1958, p. 525-535.

Study of various combinations of $PbZrO_3$ with other zirconates.

See also: **9439** (dielectric permeability of niobates and tantalates); **9505** (electrical properties of CdO); **9634** (growth of single crystals of CaO); **9812** (life of ceramic cutting tools); **9834** (characteristics of ceramic cutting tools); **9895** (slip casting of stainless steel powder).

CHEMICAL ENGINEERING

9168 Heat and Momentum Transfer in the Flow of Gases Through Packed Beds. Marvin B. Glaser and George Thodos. *A.I.Ch.E. Journal*, v. 4, no. 1, Mar. 1958, p. 63-68.

9169* Studies in Mass Transfer. II. Leaching. N. J. Hassett. *British Chemical Engineering*, v. 3, Apr. 1958, p. 182-186.

Design of extraction and mechanism; determination of number of stages and operating data.

9170* Chemical Aspects of Nuclear Reactors. II. *British Chemical Engineering*, v. 3, Apr. 1958, p. 205-207.

Reviews methods for reprocessing spent fuels and coolant practices described during the past year.

9171 Case Study of Drives for Petrochemical Compressors. Bruce Birrell. *Canadian Journal of Chemical Engineering*, v. 36, no. 2, Apr. 1958, p. 59-68.

Characteristics of drivers for large petroleum refinery compressors. Comparison of gas turbines, steam turbines, and electric motors for six different applications.

9172 The Preparation of a Crystalline High Explosive of Controlled Particle Size by Precipitation With Water From Acetone Solution. A. M. Pennie. *Canadian Journal of Chemical Engineering*, v. 36, no. 2, Apr. 1958, p. 78-81.

An impinging jet mixing head for preparing fine crystals of RDX (cyclomethylenetrinitramine).

9173 (English.) **Dry Methods for Removing Hydrogen Sulphide From Gases. A Survey.** Bengt Smith. *Chalmers Tekniska Högskolas Handlingar*, no. 184, 1957, 65 pp. (T4 C35t Contin.)

Methods utilizing lime, iron oxide, activated carbon, peat, and other materials. Reactivity of the purifying material; engineering data.

9174 Simultaneous Distillation of Ammonia and Separation of Copper From Nickel-Bearing Solutions. V. N. Mackiw, R. L. Benoit, R. J. Loree, and N. Yoshida. *Chemical Engineering Progress*, v. 54, Mar. 1958, p. 79-85.

Development of process, from laboratory work through commercial operations.

9175* (German.) Plate Extractors for Counter-Current Distribution of Easily Emulsified Pairs of Liquids. **Über Scheibenextraktoren für die Gegenstromverteilung von leicht emulgierenden Flüssigkeitspaaren.** E. Jantzen and G. Klippel. *Chemie-Ingenieur-Technik*, v. 30, no. 3, Mar. 1958, p. 121-125.

Construction of a laboratory-size apparatus.

9176* (German.) The Significance of the Reaction Rate in Determining Gas Composition in Gasification Processes. **Die Bedeutung der Reaktionsgeschwindigkeit für die Abgaszusammensetzung bei Vergasungsprozessen.** K. Hedden. *Chemie-Ingenieur-Technik*, v. 30, no. 3, Mar. 1958, p. 125-132.

Generator gas production from low-temperature coke. Compares conversion in gasification in a turbulent layer and in a static bed for uni-directional and counter-current flow of fuel and gas.

9177* (German.) High Frequency Vacuum Drying. **Vakuum-Trocknung mit Hochfrequenz.** Harald Müller. *Chemie-Ingenieur-Technik*, v. 30, no. 3, Mar. 1958, p. 133-137.

Advantages of dielectric drying in vacuo with respect to temperature and drying time. Tests in a H.F. condenser field and a dipole radiation field.

9178* The Design of Chemical Experiments. J. W. T. Spinks. *Chemistry in Canada*, v. 10, Mar. 1958, p. 36-40.

9179 Constructional Details of a Petersen Tower Sulphuric Acid Plant. J. P. A. MacDonald. *Chemistry & Industry*, 1958, no. 12, Mar. 22, p. 338-345.

9180* (French.) The Problem of Sulfur and of the Recovery of Sulfur Compounds. **Le problème du soufre et de sa récupération des produits sulfurés.** Guy Pannetier. *Chimie & Industrie*, v. 79, no. 2, Feb. 1958, p. 150-159.

Economic and technical advantages of S recovery. Extraction from H_2S. Dry and wet methods. Need for a thorough fundamental study of catalytic S recovery.

9181* (Russian.) The Arsenic-Soda Method for Removing Hydrogen Sulfide From Gas. **Opyt ochistki gaza ot serovodoroda mysh'iakovosodovym metodom.** V. I. Pan'kovskii and T. I. Kulikova. *Gazovaia Promyshlennost'*, 1958, no. 3, Mar., p. 19-22.

9182 Shallow and Deep Catalytic Dehydrogenation of Petroleum C_8-Aromatic Fraction. B. B. Corson, W. J. Heintzelman, and F. J. Pavlik. *Industrial and Engineering Chemistry*, v. 50, Apr. 1958, p. 621-622.

The C_8-fraction can be dehydrogenated on a recycle or a once-through basis to produce styrene and xylene.

9183 Continuous Freeze-Drying of *Serratia Marcescens*. H. G. Maister, E. N. Heger, and W. M. Bogart. *Industrial and Engineering Chemistry*, v. 50, Apr. 1958, p. 623-626.

9184 Size Reduction of Dried Pellets Containing *Serratia marcescens*. V. F. Pfeifer, et al. *Industrial and Engineering Chemistry*, v. 50, Apr. 1958, p. 627-632.

High-speed centrifugal mill pulverizes dried microorganisms used in aerosol production and testing.

9185 Reduced Crude Oil-Dipropylene Glycol. Liquid-Liquid Extraction System. F. F. Papa-Blanco and Matthew van Winkle. *Industrial and Engineering Chemistry*, v. 50, Apr. 1958, p. 703-706.

Data suggest how a solvent used in the petrochemical industry for purification of aromatics might behave if applied to heavy oils. Selectivity of the dipropylene glycol for the low viscosity-gravity-temperature components was very good, with the selectivity at 160 F relatively greater than that at 212 F.

9186* (Russian.) Preparation of Acetylene by the Rapid Contact Propane Cracking Method. **O poluchenii atsetilena vysokoskorostnym kontaktnym krekingom propana.** O. V. Kaminskaia, K. P. Lavrovskii, and A. M. Brodskii. *Khimiia i Tekhnologiia, Topliv i Masel*, v. 3, no. 3, Mar. 1958, p. 1-7.

Investigates cracking of propane, propane-methane mixtures, ethylene, and propane-ethane mixtures between 890 and 1100 C.

9187 (Russian.) Producing High Quality Benzene for Organic Syntheses. **Poluchenie vysokokachestvennogo benzola dlia organicheskogo sinteza.** L. Ia. Koliandr, et al. *Koks i Khimiia*, 1958, no. 2, p. 44-46.

Elimination of CS_2 and thiophene in rectification.

9188* Nonionic Surface Active Agents. I. Chemistry and Manufacture. Leon Raphael. *Manufacturing Chemist*, v. 29, Mar. 1958, p. 105-108.

Production by reaction of fatty alcohols or alkyl phenols with ethylene oxide. Cloud point; foaming and wetting characteristics.

9189* (English.) **The Chemistry of Solvent Extraction Processes for Reprocessing of Nuclear Fuels.** Göran Carleson. *Svensk Kemisk Tidskrift*, v. 70, no. 2, 1958, p. 55-75.

The basic chemistry in reprocessing nuclear fuels is discussed in relation to the solvent extraction mechanism and valid over-all theoretical equations. Theoretical and practical results for an understanding of the different extraction steps are reviewed.

9190 Separations Chemistry Quarterly Progress Report April-June 1957. G. E. Brand, et al. *U. S. Atomic Energy Commission, NAA-SR*-2168, Mar. 1, 1958, 37 pp. (UF767 Un3.1na Contin.)

Progress in the process initiation efforts on pyroprocessing methods for U fuels, mechanism of fission product extraction by oxide drossing, and high temperature separation chemistry of Th fuels.

9191 Final Report to U. S. Atomic Energy Commission; Low-Temperature Heavy Water Plant. *U. S. Atomic Energy Commission, NYO*-889(Del.), Mar. 15, 1951, 104 pp. (UF767 U3ny Contin.)

Data on production of heavy water using deuterium obtained from synthesis gas. History of project; description of plant and process; engineering data.

9192 Removing and Recovering Fluorine From Western Phosphate Rock and Utilizing the Defluorinated Rock. Milton B. Hall and Lloyd H. Banning. *U. S. Bureau of Mines Report of Investigations* 5381, Jan. 1958, 49 pp. (TN21 Un3r Vis.)

Details of laboratory and pilot-plant tests.

9193* Isceon. *World Refrigeration and Air-Conditioning*, v. 9, Mar. 1958, p. 143-149.

Production, properties, safety precautions, and uses of CCl_2F_2 and CCl_3F. Specifications for use as refrigerant.

See also: **9412** (ultrasonic atomization of liquids); **9530** (flow through microporus solids); **9557** (oils for gasification); **9567** (isotopes in study of coking of coal); **9591** (composition of crude oils); **9932** (Pu separations program); **10196** (cooling towers).

CHEMISTRY—ANALYTICAL

9194* (German.) Photometric Method of Determining Vanadium and Chromium With the Use of Variaminblue. **Photometrisches verfahren zur Vanadium und Chrombestimmung mit Variaminblau.** L. Erdey and F. Szabadváry. *Acta Chimica Academiae Scientiarum Hungaricae*, v. 13, nos. 3-4, 1958, p. 335-345.

9195 (Russian.) Investigation of Thallium Dichromate and Its Use in Quantitative Analysis. **Issledovanie bikhromata talliia i ego primenenie v kolichestvennom analize.** N. I. Bashilova. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 2, Jan. 11, 1958, p. 289-292.

A gravimetric method for quantitative determination of Tl as $TlCr_3O_7$ by its precipitation from neutral and acid solution by chromium anhydride or by sodium-potassium-, and ammonium dichromates; also, indirect methods, by the amount of reacted precipitant, and by use of radioactive Tl^{204}.

9196 (Russian.) Specific and Highly Sensitive Fluorescence Reaction for Aluminum. **Spetsificheskaia vysokochuvstvitel'naia fluorestsentnaia reaktsiia na aliuminii.** A. I. Cherkesov. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 2, Jan. 11, 1958, p. 309-311.

Mechanism of the fluorescent reaction for Al with 2,3-hydroxynaphthoic acid. The reaction can be applied for quantitative determination of Al traces using concentrations from 0.1 γ to 0.01 γ per ml.

9197* Determination of Radiogenic Helium in Zircon by Stable Isotope Dilution Technique. Paul E. Damon and J. Laurence Kulp. *American Geophysical Union, Transactions*, v. 38, no. 6, Dec. 1957, p. 945-953.

9198 A New Titrimetric Analysis for Ethylene Oxide Condensates. Lloyd E. Weeks, John T. Lewis, and Martin E. Ginn. *American Oil Chemists' Society, Journal*, v. 35, Apr. 1958, p. 149-152.

Literature search led to development of a rapid empirical titrimetric method for measuring nonionic hydrophobicity based on a water titration of a condensate dissolved in dimethylformamide and benzene.

9199 Volumetric Determination of Uranium in Presence of Iron. M. W. Desai and T. K. S. Murthy. *Analyst*, v. 83, Mar. 1958, p. 126-129.

Method based on the oxidation of reduced $U^{(IV)}$ with ferric sulphate and titration of the excess of ferric iron iodimetrically. Osmium tetroxide is used as catalyst.

9200 A Spectrochemical Solution Method for the Determination of Copper Cobalt and Iron in Copper and Cobalt Concentrates. G. L. Mason and Z. de Beer. *Analyst*, v. 83, Mar. 1958, p. 129-135.

9201 Separation by Paper Chromatography and Spectrophotometric Determination of Trace Amounts of Cobalt, Nickel, Copper, and Zinc. Joe Frierson, Dorothy A. Rearick, and John H. Yoe. *Analytical Chemistry*, v. 30, pt. 1, Apr. 1958, p. 468-471.

9202 Use of Mixed Stationary Liquids in Gas-Liquid Chromatography. W. H. McFadden. *Analytical Chemistry*, v. 30, pt. 1, Apr. 1958, p. 479-481.

The use of Tween 60 and silicone oil to separate mixtures of mono- and dibromoalkanes is illustrated and the equivalent behavior of a two-stage chromatographic column and one prepared from an intimate mixture of the two packings is shown.

9203 Apparatus for Automatic Controlled Potential Electrolysis Using an Electronic Coulometer. Lynne L. Merritt, Jr., Ernest L. Martin, Jr., and Ram Dev Bedi. *Analytical Chemistry*, v. 30, pt. 1, Apr. 1958, p. 487-492.

Apparatus is capable of performing electrolytic oxidations or reductions at controlled working-electrode potentials with automatic registration of the number of coulombs required.

9204 Conductometric Determination of Small Amounts of Oxygen in Titanium. Maurice Codell and George Norwitz. *Analytical Chemistry*, v. 30, pt. 1, Apr. 1958, p. 524-526.

The bromination-carbon reduction method is extended to small amounts of O by determining the CO_2 conductometrically instead of gravimetrically.

9205 Review of Fundamental Developments in Analysis. *Analytical Chemistry*, v. 30, pt. 2, Apr. 1958, p. 553-872.

Included among these 31 comprehensive reviews of recent work are articles on light absorption spectrometry, X-ray diffraction, emission and infra-red spectroscopy, mass spectrometry, electroanalysis, chromatography, elctron microscopy, polarography, nucleonics, fluorometric analysis, nuclear magnetic resonance spectrometry, and microbiological assays.

9206 A New Analysis for Nickel Cathodes. *Bell Laboratories Record*, v. 36, Apr. 1958, p. 146-147.

The metal is dissolved and a series of treatments and additions

of compounds separates the solution into workable sub-solutions that are studied polarographically.

9207* Test Your Soils. *Better Crops With Plant Food*, v. 42, no. 3, Mar. 1958, p. 24-25.

Some suggestions for soil sampling.

9208 Recent Research on Non-Aqueous Titrations. *Chemical Age*, v. 79, Apr. 5, 1958, p. 633-634.

Review of reactions, procedures, and apparatus.

9209 Chemical Spectra Taped. *Chemical and Engineering News*, v. 36, no. 14, Apr. 7, 1958, p. 62.

An electronic spectro-analyzer will identify and measure up to 10 mixed components simultaneously. It handles any organic mixture from hormones to hydrocarbons in minutes.

9210* (Czech.) New Fluorescent Indicators. **Nové fluorescenční indikátory. I.** Neutralization Titrations. **Neutralisační titrace. II.** Volumetric Determination of Aluminum and Zinc. **Odměrné stanovení hliníku a zinku.** Záviš Holzbecher. *Chemické Listy*, v. 52, no. 3, Mar. 1958, p. 425-438.

Dissociation constants and fluorescence transitions of 13 tested substances. Volumetric determination of Al and Zn in ultraviolet light using salicylideneaminophenol and salicylaldehyde acetylhydrazone as fluorescent indicators.

9211* (Czech.) Quantitative Evaluation of Paper Chromatograms From Changes in Impedance. **Kvantitativní vyhodnocování papírových chromatogramů ze změn impedance.** Miloš Hejtmánek and Jiřna Hejtmánková. *Chemické Listy*, v. 52, no. 3, Mar. 1958, p. 444-449.

Applicability of H.F. measurement of changes in impedance for determination of characteristics and amount of chromatographic material. Scheme of a simple device with automatic recording.

9212* (Czech.) Solubility of Metal Diethyldithiocarbamates in Organic Solvents. **Rozpustnost kovových diethyldithiokarbamidanů v organických rozpouštědlech.** Václav Šedivec and Jan Flek. *Chemické Listy*, v. 52, no. 3, Mar. 1958, p. 545-547.

Solubility of various compounds, especially those used in analysis, in alcohols, acetone, pyridine, chloroform, benzene, ether, and CCl_4. Solubility of the tested compounds in pyridine and chloroform show the highest values.

9213* (French.) Microdetermination of Aluminum in Calcium. **Microdosage de l'aluminium dans le calcium.** Hélène Ostertag and Yvette Cappelliez. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 10, Mar. 10, 1958, p. 1550-1553.

A very accurate determination of Al in metallic Ca is possible by nephelometry of Al cupferronate.

9214* (French.) The Separation of Niobium-Tantalum. **Sur la séparation niobium-tantale.** M. Herrmann. *Industrie Chimique Belge*, v. 23, no. 2, Feb. 1958, p. 123-130.

Chromatographic method on ion exchange columns.

9215* Procedure for Coal Sample Preparation. D. Flint and W. D. Ray. *Institute of Fuel, Journal*, v. 31, no. 206, Mar. 1958, p. 123-132.

Equipment for sample preparation; statistical analysis of the errors involved in coal analysis.

9216 Gas-Liquid Chromatography: Effect of Support Size and Proportion of Liquid Phase on Column Efficiency. J. D. Cheshire and R. P. W. Scott. *Institute of Petroleum, Journal*, v. 44, Mar. 1958, p. 74-79.

9217* A Simplified Method for Measuring Serotonin in Tissues; Simultaneous Assay of Both Serotonin and Histamine. Herbert Weissbach, T. Philip Waalkes, and Sidney Udenfriend. *Journal of Biological Chemistry*, v. 230, no. 2, Feb. 1958, p. 865-871.

A simple method consists of precipitation of the tissue protein with zinc hydroxide, followed by direct fluorometric measurement of the serotonin. A procedure has been presented for measuring both histamine and serotonin in the same tissue extract.

9218* Studies on the Determination of Total Nucleic Acids by Ultraviolet Absorption Methods. Junius M. Webb. *Journal of Biological Chemistry*, v. 230, no. 2, Feb. 1958, p 1023-1030.

9219 Isolation and Identification of Some Components of Cigarette Smoke Condensate. Benjamin L. Van Duuren and Alvin I. Kosak. *Journal of Organic Chemistry*, v. 23, Mar. 1958, p. 473-475.

9220* The Alkaline Nitrobenzene Oxidation of Soil Organic Matter. R. I. Morrison. *Journal of Soil Science*, v. 9, no. 1, Mar. 1958, p. 130-140.

The yields of syringaldehyde, vanillin, and *p*-hydroxybenzaldehyde obtained indicate the extent to which lignin-derived material is present.

9221* (German.) Analysis of Polyester Resins Using Paper Chromatography. **Analyse von Polyestern mit Hilfe der Papierchromatographie.** Ilse Arendt and Hans-Joachim Schenck. *Kunstoffe*, v. 48, no. 3, Mar. 1958, p. 111-113.

A simple method of quantitatively separating the dicarboxylic acid mixture, using cationic exchangers, and quantitative isolation of the glycol mixture.

9222 A New Reagent for the Colorimetric Determination of Aluminium. H. Green. *Metallurgia*, v. 57, Mar. 1958, p. 157-158.

A mixture of aluminon and ferron in a strongly buffered solution gives a strongly colored complex with Al over a wide range of contents without precipitation occurring.

9223* (French.) Spectrophotometric Determination of Aluminum and Iron in Industrial Silicon. **Détermination spectrophotométrique de l'aluminium et du fer dans les siliciums industriels.** J. Bril. *Mikrochimica Acta*, 1958, no. 2, p. 212-219.

9224* (English.) **Micro-Gravimetric Determination of Cadmium With 2-(*o*-Hydroxyphenyl)-Benzoxazole.** Ch. Cimerman and R. Pavlovec. *Mikrochimica Acta*, 1958, no. 2, p. 259-265.

9225* (German.) Infra-Red Spectrometric Determination of the Hydroxyl Content in C_{18}-Fatty Acids and Their Esters. **Die UR-spektrometrische Bestimmbarkeit des Hydroxylgehaltes in C_{18}-Fettsäuren und deren Estern.** H. Bayzer, E. Schauenstein, and K. Winsauer. *Monatshefte für Chemie*, v. 89, no. 1, Mar. 1958, p. 15-22.

Stearic acids of variable hydroxylation were studied by infra-red spectrophotometry, and the intensity ratio of OH- and CH-valence vibrations was found.

9226* (Czech.) Contribution to Method for Determining Volatile Fractions in Fuel. **Příspěvek ke stanovení prchavé hořlaviny.** J. Šart. *Paliva*, v. 38, no. 3, Mar. 1958, p. 82-83.

Indication of differences occurring in determination of volatile fraction in coal and coke using various analytical methods. Application of correction factors gives a certain uniformity; but the calculation would not always be correct.

9227* (German.) The Determination of Hydroxyl Groups in Epoxy Resins. **Zur Bestimmung von Hydroxylgruppen in Epoxydharzen.** A. Bring and Fr. Kadleček. *Plaste und Kautschuk*, v. 5, no. 2, Feb. 1958, p. 43-48.

9228* (Italian.) Spectrophotometric Determination of Aluminum and Iron by Hematoxylin. **Dosaggio spettrofotometrico di alluminio e ferro con ematossilina.** Luigi Guerreschi and Rachele Romita. *Ricerca Scientifica*, v. 27, no. 11, Nov. 1957, p. 3361-3380.

Method allows the determination of Al and Fe with a standard deviation of a single measurement amounting to 1.5% instead of 10% for Al alone.

9229* (Italian.) New Reactants for the Colorimetric Microdetermination of Hydrocyanic Acid. **Nuovi reattivi per la microdeterminazione colorimetrica dell'acido cianidrico.** Paolo malatesta and Mario Dubini. *Ricerca Scientifica*, v. 27, no. 12, Dec. 1957, p. 3649-3653.

Substitution of 3-methyl-1-phenyl-5-pyrazolone by ethyl acetonebicarbonate in the Epstein reaction. Possible use of acetoacetic ester or ethyl benzoylacetate for between 2 and 5 γ of cyanide. Stability of solutions used and effect of pH on color development.

9230 Analysis of Nonionic Surfactants. Sidney Siggia. *Soap and Chemical Specialties*, v. 34, Mar. 1958, p. 51 + 3 pages.

A review of analytical methods.

9231* (French.) Some *p*-Hydroxyaroyl- and *p*-Methoxyaroyl-3 Coumarins. **Sur des *p*-hydroxyaroyl-et *p*-méthoxyaroyl-3 coumarines.** N. P. Buu-Hoï, T. B. Loc, and N. D. Xuong. *Société Chimique de France, Bulletin*, 1958, no. 3, Mar., p. 361-363.

Synthesis and properties of a series of *p*-methoxybenzoyl-3 coumarins, obtained by condensing ethyl *p*-anisoyl-acetate with different ortho-hydroxyled aldehydes. Synthesis of dichloro-3-4-benzyl-5-salicylic aldehyde and derivatives.

9232* Spectral-Isotopic Method for the Determination of Hydrogen in Metals. A. N. Zaidel. *Spectrochimica Acta*, v. 10, no. 4, Feb. 1958, p. 369-376 + 1 plate.

9233* Spectrographic Analysis of Ores by Introducing the Powder Into the Arc in a Stream of Air. A. K. Rusanov and V. G. Khitrov. *Spectrochimica Acta*, v. 10, no. 4, Feb. 1958, p. 404-418 + 1 plate.

The powder, carried in a stream of air, is introduced evenly into the discharge zone of a horizontal carbon or metallic arc. An a.c. arc, initiated by a H.F. discharge is used.

9234* (Russian.) Amperometric Determination of Cobalt in Magnetic Alloys. **Amperometricheskoe opredelenie kobal'ta v magnitnykh splavakh.** V. F. Toropova and O. S. Strekalova. *Zavodskaia Laboratoriia*, v. 24, no. 2, 1958, p. 140-141.

Method appropriate for mass-production control with sufficient accuracy for industry.

9235* (Russian.) Determination of Molecular Weights of Dissolved Substances by the Method of Diffusion Through a Porous Glass Plate. **Opredelenie molekuliarnykh vesov rastvorennykh veshchestv metodom diffuzii cherez poristuiu stekliannuiu plastinku.** A. I. Grigor'ev, A. V. Novoselova, and K. N. Semenenko. *Zavodskaia Laboratoriia*, v. 24, no. 2, 1958, p. 190-192.

Modified method, based on measurement of the diffusion coefficient, applied to substances with a mol. wt. from 400 to 500 in the presence of other compounds.

9236* (Russian.) Application of Selenurea in Analytical Chemistry. **Primenenie selenomocheviny v analiticheskoi khimii. I.** Behavior of Selenurea Towards Heavy Metal Cations, Composition and Stability of Bismuth-Selenurea Complexes. **Otnoshenie selenomocheviny k kationam tiazhelykh metallov, sostav i ustoichivost' selenomochevinnykh kompleksov vismuta.** A. T. Pilipenko and I. P. Sereda. *Zhurnal Analiticheskoi Khimii*, v. 13, no. 1, Jan.-Feb. 1958, p. 3-10.

Bismuth, Sb, Sn, As, Au, and Pd ions form colored soluble compounds with selenurea, Pb ions and at higher concentrations, Fe^{3+} ions give specific insoluble compounds. Ions of Hg^{2+}, Cu, and Ag form colored, very stable compounds easily soluble in water.

9237* (Russian.) Use of Oscillographic Polarography in Quantitative Analysis. **Primenenie ostsillograficheskoi poliarografii v kolichestvennom analize. I.** Influence of Air Oxygen Dissolved in the Electrolyte on the Capacitive Current Value of the Neutral Electrolyte and the Maximum Current Value of Reduced Ions. **Vliianie rastvorennogo v elektrolite kisloroda vozdukha na velichinu emkostnogo toka fona i maksimal'noe znachenie toka vosstanavlivaiushchikhsia ionov.** Ia. P. Gokhshtein. *Zhurnal Analiticheskoi Khimii*, v. 13, no. 1, Jan.-Feb. 1958, p. 36-42.

9238* (Russian.) Determination of Gallium in Minerals by Means of a Rhodamine Photometric Method. **Opredelenie galliia v mineralakh pri pomoshchi rodaminovogo fotometricheskogo metoda.** V. S. Saltykova and E. A. Fabrikova. *Zhurnal Analiticheskoi Khimii*, v. 13, no. 1, Jan.-Feb. 1958, p. 63-65.

Determinating small amounts of Ga in minerals without separating accompanying elements, using rhodamine B chlorogallate extraction with a mixture of one volume of ether and three volumes of benzene.

9239* (Russian.) Photometric Determination of Tantalum in Titanium and Its Alloys by Means of Arsenazo Reagent. **Fotometricheskoe opredelenie tantala v titane i ego splavakh pri pomoshchi reagenta arsenazo.** E. I. Nikitina. *Zhurnal Analiticheskoi Khimii*, v. 13, no. 1, Jan.-Feb. 1958, p. 72-78.

Method for determining Ta in tartrate or citrate solutions using arsenazo, which in strongly acid solutions forms a soluble violet compound with Ta that is stable up to 100 C.

9240* (Russian.) Gravimetric Determination of Uranium Using Cupferron for Its Separation. **Vesovoi metod opredeleniia urana s primeneniem kupferona dlia ego otdeleniia.** S. V. Elinson and V. A. Olezniuk. *Zhurnal Analiticheskoi Khimii*, v. 13, no. 1, Jan.-Feb. 1958, p. 95-99.

9241* (Russian.) New Method for Determining Tellurium. **Novyi metod opredeleniia tellura.** I. P. Onufrienok and V. M. Aksenenko. *Zhurnal Analiticheskoi Khimii*, v. 13, no. 1, Jan.-Feb. 1958, p. 119-122.

A rapid method for the quantitative reduction of tellurite to its elemental state with lactose in a weakly alkaline medium. Development of a titrimetric method for determining Te in Sb-Te alloys.

9242* (Russian.) Bromometric Methods for the Determination of Unsaturated Hydrocarbons in Isopentane-Isoprene-Isoamylene Mixtures. **Opredelenie nepredel'nosti izopentan-izopren-izoamilenovykh smesei bromometricheskimi metodami.** B. A. Kazanskii, et al. *Zhurnal Analiticheskoi Khimii*, v. 13, no. 1, Jan.-Feb. 1958, p. 134-141.

See also: **9455** (applications of a.c. polarography); **9580** (determination of Th and U in rocks by two methods); **9911** (application of radioactivity to chemical analysis); **10174** (determination of Cu and As in carbon blacks).

CHEMISTRY—INORGANIC AND GENERAL

9243 Abstracts of Papers, 133rd Meeting of the American Chemical Society, April 13 to 18, 1958. Sections individually paged. 1958. American Chemical Society News Service, Washington, D. C. (QD1 Am35a Vis.)

An extensive compilation of abstracts of papers pertaining to all branches of chemistry.

9244* (Russian.) Investigation of Oxalate and Carbonate Plutonium Complexes in Aqueous Solutions by the Solubility Method. **Issledovanie oksalatnykh i karbonatnykh kompleksov plutoniia (IV) v vodnykh rastvorakh metodom rastvorimosti.** A. D. Gel'man and A. I. Moskvin. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 3, Jan. 21, 1958, p. 493-496.

Determination of compositions and instability coefficients.

9245 The Complexes of Pyridinaldazine With Iron(II) and Nickel(II). Wilmer J. Stratton and Daryle H. Busch. *American Chemical Society, Journal*, v. 80, Mar. 20, 1958, p. 1286-1289.

The iodide, perchlorate, and fluoborate salts were prepared and characterized.

9246 Studies on the Chemistry of Halogen and of Polyhalides. XIII. Voltammetry of Iodine Species in Acetonitrile. Alexander I. Popov and David H. Geske. *American Chemical Society, Journal*, v. 80, Mar. 20, 1958, p. 1340-1352.

A rotating Pt indicator electrode was used to study I, NaI, $(CH_3)_4NI_3$, and dipyridine iodine perchlorate.

9247 The Heat of Formation of Boric Oxide. Bernard H. Eckstein and Ervin R. Van Artsdalen. *American Chemical Society, Journal*, v. 80, Mar. 20, 1958, p. 1352-1354.

A value of 304.6 kcal. per mole was determined by burning crystalline B in O with no organic initiator.

9248 Arsenates of the Transition Metals. The Arsenates of Cobalt and Nickel. J. B. Taylor and R. D. Heyding. *Canadian Journal of Chemistry*, v. 36, Apr. 1958, p. 597-606.

Shows the existence of compounds having metal oxide to As_2O_5 ratios of 1:1, 2:1, and 3:1 and their thermal stabilities *in vacuo* and in air.

9249 Some New Fluoride Complexes of Trivalent Titanium. Norman F. H. Bright and Joseph G. Wurm. *Canadian Journal of Chemistry*, v. 36, Apr. 1958, p. 615-622.

X-ray and other data on K_2NaTiF_6, Na_3TiF_6, and K_3TiF_6.

9250 The Decomposition of Nitrous Oxide at Low Pressures on Nickel Oxide Catalysts. J. Dewing and R. J. Cvetanović. *Canadian Journal of Chemistry*, v. 36, Apr. 1958, p. 678-685.

9251 Technology of Boron Hydrides. Coleman J. Major. *Chemical Engineering Progress*, v. 54, Mar. 1958, p. 49-54.

Structure, properties, preparation, toxicity, compatibility with construction materials, and diborane patents.

9252 Preparation and Properties of Uranium Dioxide Powder. C. D. Harrington and A. E. Ruehle. *Chemical Engineering Progress*, v. 54, Mar. 1958, p. 65-70.

Commercial preparation of powder for fuel elements by denitration of uranyl nitrate and H_2 reduction, ammonium diuranate precipitation and H_2 reduction, and other methods.

9253* (English.) **Ion Exchange in Concentrated Solutions. II. Beryllium Chloride-Hydrochloric Acid System.** Hitoshi Ohtaki and Kazuo Yamasaki. *Chemical Society of Japan, Bulletin*, v. 31, no. 1, Jan. 1958, p. 6-10.

9254* (English.) **Stability of Cobalt(III) and Chromium (III) Ammine Complexes in a Strongly Alkaline Solution.** Hayami Yoneda. *Chemical Society of Japan, Bulletin*, v. 31, no. 1, Jan. 1958, p. 74-79.

Infra-red spectra and rate of decomposition of Co(III) and Cr(III) hexammine and monoaquopentammine complexes were measured in concentrated NaOH solution.

9255* (German.) Thiocomplexes of Silver and the Solubility of Silver Sulfide. **Thiokomplexe des Silbers und die Löslichkeit von Silbersulfid.** G. Schwarzenbach, O. Gübeli, and H. Züst. *Chimia*, v. 12, no. 3, Mar. 1958, p. 84-86.

The isotope Ag^{110m} was used to determine the amount of Ag remaining in solution other than that in Ag thioglycolate and Ag_2S.

9256 The Separation of Uranium From Other Metals in Sulphate Solution by Fractional Hydrolysis. I. Hydrolysis in Sulphate Solution. T. V. Arden and J. Harbutt. **II. Precipitation in the Presence of Phosphate, Arsenate and Silicate.** T. V. Arden, R. Humphries, and J. A. Lewis. *Journal of Applied Chemistry*, v. 8, pt. 3, Mar. 1958, p. 141-159.

9257 The Explosive Oxidation of Pentaborane. Harry C. Baden, Walter H. Bauer, and Stephen E. Wiberley. *Journal of Physical Chemistry*, v. 62, Mar. 1958, p. 331-334.

The lower explosion limit for mixtures of pentaborane and O on rapid mixing was studied as a function of mixture composition at 15 and 21.5 C and from 1 to 90 mm. pressure of pentaborane.

9258* (German.) New Polymorphous Form of Manganese Dioxide. **Über eine neue, polymorphe Form des Mangandioxyds.** Oskar Glemser and Herbert Meisiek. *Journal für Praktische Chemie*, v. 5, ser. 4, nos. 5-6, Feb. 1958, p. 219-223.

Properties of ϵ-MnO_2. By heating up to 425 C, ϵ-MnO_2 becomes β-MnO_2 (pyrolusite); at 525 C α-MnO_2 appears.

9259* (German.) Behavior of Some Metalloids With Hydrogen at High Temperatures. **Das Verhalten einiger Halbmetalle zu Wasserstoff bei hohen Temperaturen.** Rolf Schäfer and Wilhelm Klemm. *Journal für Praktische Chemie*, v. 5, ser. 4, nos. 5-6, Feb. 1958, p. 233-241.

Tests according to the convection method at 1000-1100 C showed that by passing H_2 over molten Ge the following reaction is obtained: $Ge_{fl} + \frac{1}{2}(H_2) = (GeH)$. The same could be done with Si, but not with Sn, Pb, and Bi.

9260* The History of the Melting of Platinum. Two Hundred Years of Progress. Donald McDonald. *Platinum Metals Review*, v. 2, no. 2, Apr. 1958, p. 55-60.

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9261 (Russian.) Synthesis of Ethanol From Carbon Dioxide and Hydrogen. **Sintez etanola iz dvuokisi ugleroda i vodoroda.** A. N. Bashkirov and V. V. Kamzolkin. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 2, Jan. 11, 1958, p. 293-296.

Investigation of a series of Fe, Co, and Ni based catalysts and effect of pressure, temperature, and composition of initial gas on the synthesis.

9262 (Russian.) New Method for Synthesis of Indoles Substituted in the Benzene Ring. **Novyi metod sinteza indolov zameshchennykh v benzol'nom iadre.** A. P. Terent'ev and M. N. Preobrazhenskaia. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 2, Jan. 11, 1958, p. 302-305.

Indole or its homologs are reduced by the usual method. The substituted indoline is dehydrogenated to yield the homologous substituted indole. Preparation of 6-nitro-1-methylindole, 6-amino-1-methylindole, and the benzoyl and phthalyl derivatives.

9263 Cleavage Studies of Simple Aromatic Boronic Acids. Henry Gilman, D. R. Swayampati, and R. O. Ranck. *American Chemical Society, Journal*, v. 80, Mar. 20, 1958, p. 1355-1357.

Benzeneboronic acid and *o*-hydroxybenzeneboronic acid anhydride were cleaved with *n*-butyllithium and the products characterized by carbonation.

9264 Acetylene-Allene Isomerization of Nonadiyne-1,4. Walter J. Gensler and Joseph Casella, Jr. *American Chemical Society, Journal*, v. 80, Mar. 20, 1958, p. 1376-1380.

Alkali at room temperature isomerizes nonadiyne-1,4 to nonadien-1,2-yne-4, and then to nonadiyne-2,4.

9265 Polynuclear Hydrocarbon Derivatives. X. Some Derivatives of 4,5-Dihydroacephenanthrylene. Robert C. Petterson and Milton C. Kloetzel. *American Chemical Society, Journal*, v. 80, Mar. 20, 1958, p. 1416-1421.

9266 Air Oxidation of Resin Acids. I. Photo-Sensitized Oxidation of Levopimaric Acid. R. N. Moore and Ray V. Lawrence. *American Chemical Society, Journal*, v. 80, Mar. 20, 1958, p. 1438-1440.

Levopimaric acid readily adds one mole of O upon exposure of its alcoholic solution, containing a suitable sensitizing dye, to air and visible light. The reaction rate is independent of resin acid concentration and directly proportional to light exposure.

9267 The Preparation and Properties of Surface-Active N-Acylamino-Methanesulfonates. Robert A. Falk, J. Fred Gerecht, and Irving J. Krems. *American Oil Chemists' Society, Journal*, v. 35, Apr. 1958, p. 171-176.

9268 Chemistry of Isobutyraldehyde. William M. Gearhart. *American Paint Journal*, v. 42, Apr. 21, 1958, p. 20 + 7 pages.

New derivatives and uses are discussed.

9269* (English.) **3-Thiophanecarboxylic Acid.** Göran Claeson. *Arkiv för Kemi*, v. 12, no. 1, 1958, p. 63-67.

Preparation by reducing 3-thiophenecarboxylic acid to the tetrahydrothiophene compound or by the reaction of Na_2S with methyl α-bromomethyl-γ-bromobutyrate.

9270* (English.) **Preparation of Racemic and Optically Active Half-Esters of Methylsuccinic Acid by Oxidation of Esters of Methylallylacetic Acids.** Gunnel Ställberg. *Arkiv för Kemi*, v. 12, no. 1, 1958, p. 79-84.

9271* (English.) **Synthesis and Configuration of the Enantiomeric β-Bromo-Isobutyric Acids.** Gunnel Ställberg. *Arkiv för Kemi*, v. 12, no. 1, 1958, p. 95-98.

(+)-2L-Methyl-3-bromopropanoic acid and (−)-2D-methyl-3-bromopropanoic acid were prepared by degradation of (−) methyl 2L-methyl-3-carboxypropanoate and (+)-methyl 2D-methyl-3-carboxypropanoate respectively.

9272* (English.) **Synthesis of the Optically Active Forms of 2-Methyloctadecanoic Acid and 2,5-Dimethyladipic Acid From the Enantiomers of Methyl 2-Methyl-3-Carboxypropanoate.** Gunnel Ställberg. *Arkiv för Kemi*, v. 12, no. 2, 1958, p. 153-159.

9273* Chemistry of Brown Coals. II. Infra-Red Spectroscopic Studies. J. D. Brooks, R. A. Durie, and S. Sternhell. *Australian Journal of Applied Science*, v. 9, no. 1, Mar. 1958, p. 63-80.

9274 Molecular Rearrangements in the Reactions of Oxygen Atoms With Olefins. R. J. Cvetanović. *Canadian Journal of Chemistry*, v. 36, Apr. 1958, p. 623-634.

Reactions of O with propylene, butene-1, *iso*-butene, *cis*-butene-2, *trans*-butene-2, *cis*-pentene-2, and tetramethyl ethylene were studied at room temperature and at pressures from 50 to 600 mm.

9275 A New Spot Test for Nitrate Ion. B. B. Coldwell and S. R. McLean. *Canadian Journal of Chemistry*, v. 36, Apr. 1958, p. 652-655.

Under the influence of short ultra-violet radiation, diphenylamine and nitrate salts produce a yellow-colored product. The reaction appears specific and makes it possible to detect 1 μg. of nitrate ion in 0.01 ml. of solution.

9276 Researches on Acetylenic Compounds. LIX. The Synthesis of Three Polyacetylenic Antibiotics. P. J. Ashworth, et al. *Chemical Society, Journal*, 1958, Mar., p. 950-954.

Syntheses of "diatretyne-I," "diatretyne-II," and "agrocybin" using a cross-coupling reaction between an appropriate derivative of propiolic acid and a C_5 component.

9277 Formation of Free Radicals During the Preparation of Organomagnesium Compounds in a Hydrocarbon Solvent. D. Bryce-Smith and G. F. Cox. *Chemical Society, Journal*, 1958, Mar., p. 1050-1053.

Studies of the reactions of *n*-butyl chloride and *n*-butyl iodide (separately and mixed) with Mg in *iso*propylbenzene indicated intermediate production of free *n*-butyl radicals.

9278 Potential Tumour-Inhibitors Based on Diazomethane. J. A. Hendry, F. L. Rose, and A. L. Walpole. *Chemical Society, Journal*, 1958, Mar., p. 1134-1140.

Cyanuric chloride reacts readily in the cold with diazomethane to yield the corresponding dichlorodiazomethyl-1,3,5-triazine. The remaining Cl atoms have been replaced by a variety of amine residues, including ethyleneimine.

9279 Polymerizations of Ethylene in the Presence of Titanium Tetrachloride and Certain Metal Alkyls. J. C. McGowan and B. M. Ford. *Chemical Society, Journal*, 1958, Mar., p. 1149-1152.

Polymerization at 30 C with $TiCl_4$ and an excess of either butyllithium or dibutylzinc as catalysts.

9280 Phenylation With Diazoaminobenzenes. R. L. Hardie and R. H. Thomson. *Chemical Society, Journal*, 1958, Mar., p. 1286-1290.

Pyrolysis of diazoaminobenzene in aromatic solvents at 150-160 C generates phenyl and anilino-radicals. The former attack the solvent, giving relatively high yields of diphenyl derivatives and negligible amounts of by-products.

9281 The Inaugural Simonsen Lecture: Some Aspects of Sesquiterpenoid Chemistry. D. H. R. Barton. *Chemical Society, Proceedings*, 1958, Mar., p. 61-66.

Eremophilone, santonin, and their derivatives are discussed.

9282* (Czech.) Properties of Sulfide Catalysts. **O vlastnostech sirníkových katalysátorů. VI.** Dehydration and Dehydrogenation Properties of Molybdenum- and Tungsten-Bisulfides. **Dehydratační a dehydrogenační vlastnosti sirníku molybdeničitého a wolframičitého.** Stanislav Landa, Otto Weisser, and Jiří Mostecký. *Chemické Listy*, v. 52, no. 1, Jan. 1958, p. 60-67.

Heating alcohols in presence of MoS_2, WS_2, and commercial catalyst 5058 in catalyst chambers and transfer lines near 300 C shows that these dehydrate the alcohols chiefly into olefine and ethers. Dehydrogenation also takes place.

9283* (Czech.) Contributions to the Chemistry of the Rare Elements. **Příspěvky k chemii vzácnějších prvků. V.** Catalytic Properties of Scandium Oxide. **Některé katalytické vlastnosti kysličníku skanditého.** Josef Pašek, František Jošt, and František Petrů. *Chemické Listy*, v. 52, no. 3, Mar. 1958, p. 405-409.

A study of catalytic decomposition of 2-propanol with Sc_2O_3. During decomposition above 380 C two simultaneous reactions take place: dehydration towards propene $CH_3CHOHCH_3 \rightarrow CH_3CH{=}CH_2 + H_2O$, and dehydrogenation towards acetone $CH_3CHOHCH_3 \rightarrow CH_3COCH_3 + H_2$. Also, study of acetic acid decomposition in presence of Sc_2O_3.

9284* (Czech.) Anomalous Reaction of Di-*p*-chlorophenylacetamide and Di-*p*-chlorophenylacetonitrile With Lithium Aluminum Hydride. **Anomální reakce di-*p*-chlorfenylacetamidu a di-*p*-chlorfenylacetonitrilu s hydridem lithnohlinitým.** Hana Komrsová and Jiří Farkaš. *Chemické Listy*, v. 52, no. 3, Mar. 1958, p. 454-457.

9285 A New Ring Enlargement: Reaction of Nitrocycloalkanes With Lithium Aluminium Hydride. G. E. Lee, E. Lunt, W. R. Wragg, and H. J. Barber. *Chemistry & Industry*, 1958, no. 14, Apr. 5, p. 417-418.

Reduction of tertiary nitrocycloalkanes give, the normal primary amine, and similar secondary amine fractions.

9286* (French.) Basicity of Amino Alcohols and the MacInnes Relationship. **Basicité des amino-alcools et relation de MacInnes.** Gisèle Girault and Paul Rumpf. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 11, Mar. 17, 1958, p. 1705-1707.

A study of the basicity of a series of hydroxylated aliphatic amines at the end of a non-ramified hydrocarbon chain. The values found for their pK_H and the hydroxylamine pK_H are expressed by an empirical linear relationship.

9287* (French.) Investigations of Amino Acids. Chromic Oxidation of Amino Alcohols. **Recherches sur les aminoacides. Oxydation chromique des amino-alcools.** Martin Olomucki and Israël Marszak. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 11, Mar. 17, 1958, p. 1714-1717.

Chromic oxidation of amino alcohols produces the corresponding amino acids in a simple way and with satisfactory yields. Dimethyl aminoacetatic and dimethyl amino-4-butanoic acids were prepared.

9288* A Century of Diazo Compounds. E. R. Ward and J. L. Randall. *Discovery*, v. 19, Apr. 1958, p. 155-161.

A review of work dating from discovery in 1858 by Peter Griess, and covering reactions, explosive properties, and use in chemotherapy and document reproduction.

9289 (German.) The Total Synthesis of 18-Oxygenated Etio-Esters. **Totalsynthese von 18-oxygenierten Ätiansäuren.** P. Wieland, K. Heusler, H. Ueberwasser, and A. Wettstein. *Helvetica Chimica Acta*, v. 41, no. 2, 1958, p. 416-440.

Preparation of 18-substituted etio-acid derivatives from 16-oxoandrostanes by condensation with a formic ester, etherification of the hydroxymethylene compound formed, reduction of the 16-oxo group, acid cleavage to give an α, β-unsaturated etioaldehyde, catalytic reduction, and oxidation with permanganate.

9290 (French.) Effects of Some Substituents on the Statistics of Linear Paraffin Chains. **Influence de quelques substituants sur la statistique des chaines paraffiniques linéaires.** N. Hamaide. *Journal de Chimie Physique*, v. 55, no. 1, Jan. 1958, p. 9-15.

The statistics are not changed much by O, but are greatly modified by Br. Experimental results are explained by the hypothesis of a coupling between the two ends of the chain by means of the Br atoms.

9291 The Reformatsky Reaction in Syntheses of ω,ω-Diarylalkanoic Acids and Related Compounds. L. H. Klemm and G. M. Bower. *Journal of Organic Chemistry*, v. 23, Mar. 1958, p. 344-348.

Reports experiments on the Reformatsky reaction between benzophenone and various methoxy-substituted benzophenones, also between the bromoesters ethyl bromoacetate and methyl γ-bromocrotonate.

9292 Syntheses of 3,3'-Dimethoxybenzophenone. *Para* Substitution in Acylation of the Organocadmium Reagent From *m*-Haloanisoles. L. H. Klemm, Roger Mann, and C. D. Lind. *Journal of Organic Chemistry*, v. 23, Mar. 1958, p. 349-353.

9293 Some Oxygen-Containing Heterocycles as Liquid Scintillator Solutes. Henry Gilman, Eugene A. Weipert, Joseph J. Dietrich, and F. Newton Hayes. *Journal of Organic Chemistry*, v. 23, Mar. 1958, p. 361-362.

Derivatives of dibenzofuran, dibenzo-*p*-dioxin, and xanthene were screened as liquid scintillator solutes. Results suggest that methoxy derivatives increase the relative pulse height.

9294 Derivatives of Sulfenic Acids. XXIX. Bis(2,2'-fluorosulfonyl) azobenzene *via* 2-Nitrobenzenesulfenyl Chloride and Hydrogen Fluoride. David L. Chamberlain, David Peters, and Norman Kharasch. *Journal of Organic Chemistry*, v. 23, Mar. 1958, p. 381-385.

9295 Halopropargyl Alcohols and Ethers. Lewis F. Hatch, William E. Blankenstein, and Shih Hsi Chu. *Journal of Organic Chemistry*, v. 23, Mar. 1958, p. 397-401.

Preparation and properties of 14 compounds.

9296 Santonin and Related Compounds. XIII. Attempted Preparation of *trans*-3,5-Diketo-α-sant-$\triangle^3$-enic Acid. Masaiti Yanagita and Haruo Ogura. **XIV. Bromination and Dehydrobromination of *cis*- and *trans*-2,9-Dimethyl-3-Decalones.** Reigi Futaki. *Journal of Organic Chemistry*, v. 23, Mar. 1958, p. 443-457.

9297 Contribution to the Study of Marine Products. XLVI. 24- and 25-Dehydrocholesterol. Werner Bergmann and John P. Dusza. *Journal of Organic Chemistry*, v. 23, Mar. 1958, p. 459-461.

Preparation of 24- and 25-dehydrocholesterol from 25-ketonorcholesterol. The identity of desmosterol and 24-dehydrocholesterol was substantiated.

9298* (Russian.) Effect of the Conditions of Preparation of Naphthenic Acid Aluminum Soaps on the Properties of Their Oleogels. **Vliianie uslovii prigotovleniia aliuminievykh mylnafenovykh kislot na svoistva ikh oleogelei.** G. V. Belugina and A. A. Trapeznikov. *Kolloidnyi Zhurnal*, v. 20, no. 1, Jan.-Feb. 1958, p. 3-12.

Al-soaps were prepared by the usual double decomposition method ("direct precipitation") and by a precipitation method in which aqueous solutions of $Al_2(SO_4)_3$ and Na soaps are poured together, the pH being held constant. The following factors affect the thickening properties of the soaps and the structure and stability of their oleogels: the ratio of free to bound alkali, the pH during precipitation, and temperature.

9299* The Chemistry of Lubricating Oil and Fuel Additives. D. P. Dodgson. *Petroleum*, v. 21, Apr. 1958, p. 119 + 5 pages.

Antioxidants, corrosion inhibitors, detergents, rust inhibitors, viscosity index improvers, pour point depressants, gear lubricants, industrial oils and fuels are discussed.

9300* (English.) **Photochlorination of Butyryl, Valeryl and Caproyl Chloride.** P. Smit and H. J. den Hertog. *Recueil des Travaux Chimiques des Pays-Bas*, v. 77, no. 1, Jan. 1958, p. 73-80.

The acid chlorides were reacted with Cl under radiation from a Hg lamp.

9301* (German.) Investigations of the Nitroderivatives of Pyridine. **Untersuchungen ueber Nitroderivate des pyridins.** Wladyslaw Czuba and Edwin Plażek. *Recueil des Travaux Chimiques des Pays-Bas*, v. 77, no. 2, Feb. 1958, p. 92-96.

2,6-Dinitro-3-hydroxypyridine is formed by the nitration of 2-nitro-3-hydroxypyridine in the presence of acetic anhydride. With PCl_5, 2,6-dinitro-3-chloropyridine is obtained.

9302 Reactions of the Ethyl Radical. I. Metathesis With Unsaturated Hydrocarbons. II. Addition to Unsaturated Hydrocarbons. D. G. L. James and E. W. R. Steacie. *Royal Society, Proceedings*, v. 244, ser. A, Mar. 25, 1958, p. 289-311.

Kinetic study of the abstraction of the H atom from selected hydrocarbons by the ethyl radical, also of addition of this radical to the multiple bond.

9303 Gas-Phase Oxidation of Butene-2. A. Blundell and G. Skirrow. *Royal Society, Proceedings*, v. 244, ser. A, Mar. 25, 1958, p. 331-344.

Study between 289 and 395 C. Excess olefin produced an apparent inhibiting effect.

9304 Surfactants Listed. Fourth Revision of Synthetic Detergents and Emulsifiers. V. John W. McCutcheon. *Soap and Chemical Specialties*, v. 34, Apr. 1958, p. 54-67.

Lists trade names, manufacturers, class and formula, main uses, and other facts.

9305* (French.) Structural Organic Chemistry. Isomerization of the Alcohol Derivatives of Vinyl-2-Dihydro-2,3-Furan Into Cyclopentene-1-Carbonyl Products. **Chimie organique structurale. Isomérisation des dérivés alcoyles du vinyl-2 dihydro-2,3 furanne en produits cyclopentène 1-carbonyles.** Joseph Wiemann and Sa-Le Thi Thuan. *Société Chimique de France, Bulletin*, 1958, no. 2, Feb., p. 199-203.

Mechanism of isomerization. Origin of the products obtained is explained by the hydration and oxidation of the cyclopentene compounds. Different isomers are obtained by the dehydration of dipropenyl glycol.

9306* (French.) Some Observations on the Wurtz Reactions Produced With Iron in an Aqueous Medium. **Quelques observations sur les réactions de Wurtz réalisée avec le fer en milieu aqueux.** N. P. Buu-Hoï and Denise Lavit. *Société Chimique de France, Bulletin*, 1958, no. 3, Mar., p. 292-294.

Application of the Fe powder method in connection with α-chlorinated aryl-aliphatic derivatives.

9307* (French.) Synthesis of Some Dimethoxyalkanes. **Synthèse de quelques diméthoxyalcanes.** N. Hamaide. *Société Chimique de France, Bulletin*, 1958, no. 3, Mar., p. 306-310.

Some methods for the preparation of the ω-dimethoxyalkanes CH_3O-$(CH_2)n$-OCH_3. The acyloination reaction and the Blaise synthesis were explained and 11 compounds described, with *n* from 3 to 36.

9308* Oil and Water Repellent Treatments for Cotton With Fluorochemicals. Leon Segal, F. J. Philips, Leopold Loeb, and R. L. Clayton, Jr. *Textile Research Journal*, v. 28, Mar. 1958, p. 233-241.

The relative effectiveness of various repellency treatments as governed by fabric construction; effect on physical properties, rot resistance, soil resistance, and launderability.

9309 (Russian.) Thiazolocarbocyanines With Aryl Radicals in Thiazole Nuclei. **Tiazolokarbotsianiny s aril'nymi radikalami v tiazol'nykh iadrakh. III.** Methoxyarylthiazolocyanines. **Metoksiariltiazolokarbotsianiny.** E. D. Sych. *Ukrainskii Khimicheskii Zhurnal*, v. 24, no. 1, 1958, p. 79-88.

2-Methyl-5-(*n*-methoxyphenyl)-thiazole, 2-methyl-5-(*n*-phenoxyphenyl-thiazole, 2-methyl-5-(*n*'-methoxy-*n*-biphenylyl)-thiazole, and 2-methyl-5-(4-methoxy-1-naphthyl)-thiazole were prepared. Monomethienecyanines, trimethinecyanines, and styryls were obtained from the quaternary salts.

See also: **9356** (structure and properties of hydrocarbons); **9413** (alkyd resin chemistry); **9451** (reactions of hydrocarbons in an electric field); **10066** (castor oil products).

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9310* (German.) Investigation of Atomic Emissions by Flame Photometry. **Flammenphotometrische Untersuchung der atomaren Emissionen. I.** Flame Photometric Properties of Silver Salts. **Flammenphotometrische Eigenschaften der Silbersalze.** E. Pungor and I. Konkoly Thege. *Acta Chimica Academiae Scientiarum Hungaricae*, v. 13, nos. 3-4, 1958, p. 235-241.

9311* (German.) Investigations of the Reversibility of the Redox System Triphenyl Tetrazolium Chloride-Formazan. **Untersuchungen über die Reversibilität des Redoxsystems Triphenyltetrazoliumchlorid/Formazan.** B. Jámbor. *Acta Chimica Academiae Scientiarum Hungaricae*, v. 13, nos. 3-4, 1958, p. 293-306.

Investigations by polarography proved, that the reduction potential of TTC and the oxidation potential of TF depend on the pH value and temperature of the medium.

9312* (Russian.) Study of the Solubility Diagram of the Ga_2O_3-Na_2O-H_2O System. **Izuchenie diagrammy rastvorimosti sistemy Ga_2O_3-Na_2O-H_2O.** S. V. Gevorkian and N. A. Gurovich. *Akademiia Nauk Armianskoi SSR, Izvestiia, Seriia Khimicheskikh Nauk*, v. 10, no. 6, 1957, p. 387-393.

Physicochemical behavior of Ga in alkaline solutions as shown by the equilibrium diagram of the ternary system at 18 and 60 C. The maximum solubility of $Ga(OH)_3$ at 18 C is three times higher than that reported by Fricke and Blencke. Solubility of $Ga(OH)_3$ and gallates in solutions of NaOH increases with a temperature. The isotherm at 60 C is higher than the isotherm at 18 C.

9313* (Russian.) Effect of pH and the Complex-Formation Reactions on the Potential of Ceric-Cerous System. **Vliianie pH i reaktsii kompeklsoobrazovaniia na potentsial tseri-tsero sistemy.** V. M. Taraian and L. A. Eliazian. *Akademiia Nauk Armianskoi SSR, Izvestiia, Seriia Khimicheskikh Nauk*, v. 10, no. 6, 1957, p. 395-401.

Determination of the effect of pyrophosphate and hexametaphosphate on the redox potential of Ce^{4+}/Ce^{3+} system at various pH. In pH range from 1.26 to 9.5 the potential of the system alternates from 1.43 to 0.26 volts; in presence of pyrophosphate, in pH range from 1.99 to 10.4, it alternates from 0.96 to 0.32 v; and in presence of hexametaphosphate in pH range from 1.28 to 10.2, from 1.03 to 0.31 v. In all three cases the potential increases with an increase of pH.

9314 (Russian.) Free Energy, Heat and Entropy of Adsorption Displacement of Alcohols by Water From the Surface of an Oxide Catalyst. **O svobodnoi energii, teplote i entropii adsorbtsionnogo vytesneniia spirtov vodoi s poverkhnosti okisnogo katalizatora.** A. A. Balandin, O. K. Bogdanova, and A. P. Shcheglova. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 2, Jan. 11, 1958, p. 312-314.

9315 (Russian.) Adsorption From Three-Component Solutions. **Adsorbtsiia iz trekhkomponentykh rastvorou.** N. N. Griazev. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 2, Jan. 11, 1958, p. 317-320.

Determination of the adsorption isotherms of acetic acid-lauric acid-cetane system in a wide range of concentrations and plotting three-dimensional isotherms of adsorption. High activity Si clay was used as adsorbent.

9316* (Russian.) Catalysis on Intrinsic Semiconductors. **O katalize na poluprovodnikakh v oblasti sobstvennoi provodimosti.** O. V. Krylov and S. Z. Roginskii. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 3, Jan. 21, 1958, p. 523-525.

Characteristics of the intrinsic conductivity of Cr_2O_3, Cu_2O, ZnO, and ZnTe catalysts.

9317 A Comparison Between the Dimensions of Some Macromolecules Determined by Electron Microscopy and by Physical Chemical Methods. Cecil E. Hall and Paul Doty. *American Chemical Society, Journal*, v. 80, Mar. 20, 1958, p. 1269-1274.

Data on dimensions and size-distribution of asymmetric macromolecules, indicated that electron microscopy is a reliable method for studying macromolecules of soluble collagen, fragmented deoxyribose nucleic acid, and polypeptides.

9318 Variable Capacity Anion Exchange Resins From Quaternized Dimethylaminostyrenestyrene Bead Copolymers. Richard H. Wiley and J. M. Schmitt. *American Chemical Society, Journal*, v. 80, Mar. 20, 1958, p. 1389-1391.

A series of bead copolymers of dimethylaminostyrene and styrene cross-linked with 1-20% of divinylbenzene were quaternized with methyl iodide at room temperature. Divinylbenzene cross-linked (10%) resins having exchange capacities of 1.47, 2.35, 2.80, and 3.00 meq./g. are described.

9319 Entrapment of Gas in the Spreading of a Liquid Over a Rough Surface. S. G. Bankoff. *A.I.Ch.E. Journal*, v. 4, no. 1, Mar. 1958, p. 24-26.

Conditions for the incomplete displacement of gas from the valley between two parallel ridges by a liquid-drop front advancing over the ridges are calculated. Significant parameters are the liquid density, surface tension, contact angle, and geometry of the ridges.

9320 Properties of Water. II. The Equation of State of Water and Sea Water at Low Temperatures and Pressures. Carl Eckart. *American Journal of Science*, v. 256, no. 4, Apr. 1958, p. 225-240.

9321* (French.) Study of the Effect of the Molecular Environment on the Spectroscopic Properties of the Carbonyl Group in Ultra-Violet and Infra-Red. **Étude de l'influnce de l'environnement moléculaire sur les propriétés spectroscopiques du groupe carbonyle en ultraviolet et en infrarouge.** Pierre Maroni. *Annales de Chimie*, v. 2, Nov.-Dec. 1957, p. 757-818.

A precise quantitative investigation of the position of the two characteristic bands of carbonyl as function of the molecular structure. Aliphatic saturated ketones with a variety of C chains and β-hydroxyketones with primary, secondary, and tertiary alcohol function were tested.

9322* (French.) Hydration of Hydrophilic Polymers. Solubility. Salting Out. **Hydratation des polymères hydrophiles. Solubilité. Relargage.** Jean Néel. *Annales de Chimie*, v. 2, Nov.-Dec. 1957, p. 870-915 + 1 plate.

Nature and mechanism of the hydration of organic polymers; behavior of heterogeneous ternary systems (a macromolecular water-salt mineral compound) by an analytical method called the "residue method". Polyvinyl alcohol and a horse serum albumin were tested.

9323* **The Carbon-Steam Reaction at High Pressure.** J. D. Blackwood and F. McGrory. *Australian Journal of Chemistry*, v. 2, no. 1, Feb. 1958, p. 16-33.

Reactions of purified carbon with steam at pressures up to 50 atm. and in the temperature range 750-830 C. Effect of H. At a high steam H pressures and low temperatures a considerable proportion of the C is gasified as CH_4.

9324 Studies of the Mechanism of the Formation and Decomposition of the Molecular Complex Between Solid Urea and *n*-Octane Vapor. H. G. McAdie and G. B. Frost. *Canadian Journal of Chemistry*, v. 36, Apr. 1958, p. 635-651.

9325 Surface Tension for Pure Liquids. Wallace R. Gambill. *Chemical Engineering*, v. 65, Apr. 7, 1958, p. 146-150.

Methods for estimating surface tension.

9326* Nomogram: How to Estimate Solubility of Water in Hydrocarbons. D. S. Davis. *Chemical & Process Engineering*, v. 39, Mar. 1958, p. 99.

9327* (English.) **Dielectric Properties of Starch. I. Audio Frequency Region. II. High Frequency Loss Process.** Sôzaburo Ono, Takashi Kuge, and Naokazu Koizumi. *Chemical Society of Japan, Bulletin*, v. 31, no. 1, Jan. 1958, p. 34-45.

9328* (English.) **Phase Transition of Li_2O-Fe_2O_3 System. I. Thermal and Electric Properties of Lithium Ferrite $LiFeO_2$. II. Thermal and Electric Properties of Lithium Ferrospinel $LiFe_5O_8$.** Eizo Kato. *Chemical Society of Japan, Bulletin*, v. 31, no. 1, Jan. 1958, p. 108-117.

9329 The Light Absorption of Pyrroles. I. Ultraviolet Spectra. Ulli Eisner and P. H. Gore. *Chemical Society, Journal*, 1958, Mar., p. 922-927.

Data on 42 compounds. Correlations between structure and light absorption are attempted.

9330 The Application of Infrared Spectroscopy to a Study of Some Reaction Intermediates and Products of the Autoxidation of Long-Chain Olefins. J. Gold. *Chemical Society, Journal*, 1958, Mar., p. 934-942.

The action of gaseous O on methyl oleate and elaidate, long-chain α-diols, epoxides, α-ketols, and α-diketones was studied.

9331 Heats of Combustion and Molecular Structure. IV. Aliphatic Nitroalkanes and Nitric Esters. R. C. Cass, et al. *Chemical Society, Journal*, 1958, Mar., p. 958-963.

Data on nitromethane, nitroethane, 1-nitropropane, 2-nitropane, dimethylnitramine, and diethylnitramine.

9332 The Infrared Spectra of *N*-Heteroaromatic Systems. I. The Porphins. S. F. Mason. *Chemical Society, Journal*, 1958, Mar., p. 976-982.

9333 Parachors and Molecular Structure of Some Metal Alkoxides. D. C. Bradley, C. C. A. Prevedorou, J. D. Swanwick, and W. Wardlaw. *Chemical Society, Journal*, 1958, Mar., p. 1010-1014.

The densities and surface tensions of several alkoxides of Ti, Zr, Sn, Ce, and Th were measured between 25 and 40 C and the parachors calculated.

9334 Structure and Properties of Mesomeric Systems. I. Resonance Energies. II. The Chemical Reactivity of Alternant and Non-Alternant Hydrocarbons. III. Charge Distribution and Related Properties in Non-Alternant Hydrocarbons. David Peters. *Chemical Society, Journal*, 1958, Mar., p. 1023-1047.

9335 Aluminium Phosphates. II. Ion-Exchange and pH-Titration Studies of Aluminium Phosphate Complexes in Solution. J. E. Salmon and J. G. L. Wall. *Chemical Society, Journal*, 1958, Mar., p. 1128-1134.

9336 Gas-Liquid Partition Chromatography of Mixtures of Aryl Methyl Ethers. W. Carruthers, R. A. W. Johnstone, and J. R. Plimmer. *Chemistry & Industry*, 1958, no. 11, Mar. 15, p. 331.

9337* (French.) Recovery of Some Salts by Cooling Saturated Solutions of the Salt and the Corresponding Acid. **Récupération de certains sels par refroidissement de leurs solutions saturées en sel et en acide homo-ionique.** G. De Lattre. *Chimie & Industrie*, v. 79, no. 2, Feb. 1958, p. 160-162.

Change of solubility of $FeSO_4 \cdot nH_2O$ and $CuSO_4 \cdot nH_2O$ in water with H_2SO_4 concentration and temperature. Solubility decreases when temperature is lowered and when the H_2SO_4 content rises. Solubility isotherms and application.

9338* (French.) Interpretation of the Energy of Activation of Dissociation of Manganese Dioxide. **Interprétation de l'energie d'activation de dissociation du bioxyde de manganèse.** Kalésory Traoré and Jean Brenet. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 10, Mar. 10, 1958, p. 1541-1542.

Determination of the reticular energy of α Mn_2O_3 by two methods. The energy of activation of dissociation is explained by consideration of the lattice deformations and bonding energy of Mn = O.

9339* (French.) Ionic Dissociation of Silver Nitrate in Absolute Ethanol. **Sur la dissociation ionique du nitrate d'argent dans l'éthanol absolu.** Marthe Kikindai. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 11, Mar. 17, 1958, p. 1683-1688.

Variation of the conductivity of $AgNO_3$ solutions in absolute ethanol is somewhat proportional to the temperature between 15 and 45 C; this proportion decreases with increased concentration.

9340 Comparison of the Active With the Inactive Uranium Dioxide-Oxygen System. D. A. Vaughan and R. K. Willardson. *Engineers Joint Council, Nuclear Engineering & Science Conference Preprint* 13, 1958, 15 pp. (TK9006 En34p Vis.)

Structural studies of the UO_2-oxygen systems for active and inactive UO_2 revealed little or no difference for compositions below $UO_{2.25}$. However, for compositions above $UO_{2.25}$, the active oxide oxidized to a product which has less lattice distortion than the oxidation product of the inactive oxide. Electrical properties and lattice parameters were studied.

9341 Solvation Spectra. I. The Effect of Environmental Changes Upon the Ultra-Violet Absorption of Solvated Iodide Ions. II. The Nature of the Electronically Excited State of Solvated Iodide Ions. M. Smith and M. C. R. Symons. *Faraday Society, Transactions*, v. 54, pt. 3, Mar. 1958, p. 338-352.

9342 The Thermal Reaction Between Hydrogen and Nitrogen Dioxide. IV. Thermal Ignitions of Hydrogen and Nitrogen Dioxide. P. G. Ashmore and B. P. Levitt. *Faraday Society, Transactions*, v. 54, pt. 3, Mar. 1958, p. 390-393.

The ignition boundary was determined as a function of composition between 516 and 570 C.

9343 Heats of Chemisorption of Gases on Cobalt. R. Rudham and F. S. Stone. *Faraday Society, Transactions*, v. 54, pt. 3, Mar. 1958, p. 420-428.

Heats of adsorption of H, O, and N_2O on reduced Co were determined using an adsorption calorimeter. The heat of adsorption of H at 20 C is 25 kcal/mole at zero coverage, falling to 13 kcal/mole at 30% coverage.

9344 Proton Migration in Hydrophilic Organic Film. C. D. Niven. *Faraday Society, Transactions*, v. 54, pt. 3, Mar. 1958, p. 441-445.

The resistance of thin films of gelatin increased with the length of time of exposure to strong electric field, but would not return quickly to normal value by merely reversing the field.

9345* (German.) Significance of Urea Method in Characterizing Commercial Carbohydrates. **Die Ergebnisse der Harnstoff-Methode bei der Kennzeichnung von technischen Kohlenwasserstoffen.** H. Lux. *Fette, Seifen, Anstrichmittel*, v. 60, no. 1, Jan. 1958, p. 22-26.

Method of separating "foreign" parts in *n*-paraffins. Relationship between the dissolving ability of the paraffin and the amount of impurities.

9346* (German.) The Effect of Absorbed Gases on the Physical Properties of Solid Bodies. **Der Einfluss adsorbierter Gase auf physikalische Eigenschaften der Oberfläche fester Körper.** Hasso Moesta. *Fortschritte der Chemischen Forschung*, v. 3, no. 4, 1958, p. 657-721.

Survey of different methods of obtaining pure surfaces. Theory of the interaction between absorbed particles and the absorber. Electrical conductivity of thin layers. Secondary electron emission. Direct examination of absorbed particles. Metal conductors and semiconductors. Thermal accomodation.

9347 Ion Exchange Separation of Uranium From Thorium. R. H. Poirer, G. D. Calkins, G. A. Lutz, and A. E. Bearse. *Industrial and Engineering Chemistry*, v. 50, Apr. 1958, p. 613-616.

Uranium was separated and concentrated from sodium carbonate solutions of monazite sand residues using strong base ion-exchange resins, particularly Amberlite IRA-400. The interference of anions present in monazite process solutions on the exchangeability of the uranyl carbonate complex was evaluated, and exchange data were obtained on the solution prepared from a typical sample of concentrates of Brazilian sand.

9348 Combustion of Metals in Oxygen. A. V. Grosse and J. B. Conway. *Industrial and Engineering Chemistry*, v. 50, Apr. 1958, p. 663-672.

Metals which burn at high temperatures are discussed in terms of their location in the periodic table. The "skating sun" phenomenon suggests a high-temperature radiation source. Flames are effective in cutting through thick concrete and ceramic materials.

9349 Double-Bond Formation in Paraffinic Hydrocarbons on Exposure to Ionizing Radiation. R. M. Black. *Journal of Applied Chemistry*, v. 8, pt. 3, Mar. 1958, p. 159-163.

Changes in types of unsaturation induced by pile irradiation of *n*-decane, Vaseline, and polyethylene studied by measurements of infra-red absorption and the I number.

9350 Thermistor Detectors in Gas Chromatography. A. D. Davis and G. A. Howard. *Journal of Applied Chemistry*, v. 8, pt. 3, Mar. 1958, p. 183-186.

Simple instrument for gas-chromatographic analysis employs a single thermistor as the detector.

9351 Anisotropic Color Centers in α-Quartz. II. Germanium-Doped Synthetic Quartz. Alvin J. Cohen and Herbert L. Smith. *Journal of Chemical Physics*, v. 28, Mar. 1958, p. 401-405.

A color center absorption band system in the 2750 A region of α-quartz is related to Ge impurity. The Ge must be in a substitutional position.

9352 Irreversible Electrochemical Processes in Membranes. II. Effects of Solvent Flow. Yonosuke Kobatake. *Journal of Chemical Physics*, v. 28, Mar. 1958, p. 442-448.

Correlation of the osmotic flow of the electrolyte solution with the membrane potential and the ionic permeability is discussed from the standpoint of irreversible thermodynamics of continuous systems.

9353 Thermodynamics of Nonstoichiometric Nickel Tellurides. I. Heat Capacity and Thermodynamic Functions of the δ Phase From 5 to 350°K. E. F. Westrum, Jr., C. Chou, R. E. Machol, and F. Grønvold. *Journal of Chemical Physics*, v. 28, Mar. 1958, p. 497-503.

9354* **Phosphorescence Studies of Some Heterocyclic and Related Organic Compounds.** Richard C. Heckman. *Journal of Molecular Spectroscopy*, v. 2, no. 1, Feb. 1958, p. 27-41.

Phosphorescence spectra of indene, indole, thianaphthene, fluorene, carbazole, dibenzofuran, and dibenzothiophene in rigid glass solutions were photographed. Cyclopentadiene, pyrrole, furan, and thiophene did not phosphoresce.

9355 An Extended Table of Hammett Substituent Constants Based on the Ionization of Substituted Benzoic Acids. Darl H. McDaniel and Herbert C. Brown. *Journal of Organic Chemistry*, v. 23, Mar. 1958, p. 420-427.

Recommends a return to use of the dissociation constants of substituted benzoic acids as a basis for evaluating the above.

9356 Molecular Structure and Properties of Hydrocarbons and Related Compounds. John B. Greenshields and Frederick D. Rossini. *Journal of Physical Chemistry*, v. 62, Mar. 1958, p. 271-280.

Empirical equations, involving only structural parameters, for calculating isomeric variation in the values of certain physical and thermodynamic properties of the paraffin hydrocarbons.

9357 Flat Flame Studies on Ethylene Glycol Dinitrate. I. Temperature Profiles. R. Steinberger and V. P. Schaaf. *Journal of Physical Chemistry*, v. 62, Mar. 1958, p. 280-285.

A fritted glass burner was used to stabilize the flame. Probing with a fine-wire thermocouple resulted in a temperature profile showing two distinct reaction zones.

9358 The Solubility and Entropy of Solution of Iodine in *n*-C_7F_{16}, c-$C_6F_{11}CF_3$, $(C_3F_7COOCH_2)_4C$, c-$C_4Cl_2F_6$, CCl_2FCClF_2 and $CHBr_3$. Kōzō Shinoda and J. H. Hildebrand. *Journal of Physical Chemistry*, v. 62, Mar. 1958, p. 292-294.

9359 The Development and Properties of an Adsorbent for Uranium. Leslie A. McClaine, Paul Noble, Jr., and Edward P. Bullwinkel. *Journal of Physical Chemistry*, v. 62, Mar. 1958, p. 299-303.

The surface of a porous char is modified with an organic substance which has a very low aqueous solubility and a strong tendency to form chelate compounds with U under the solution conditions at which U adsorption is desired.

9360 The Vapor Pressures of Zirconium Tetrachloride and Hafnium Tetrachloride. A. A. Palko, A. D. Ryon, and D. W. Kuhn. *Journal of Physical Chemistry*, v. 62, Mar. 1958, p. 319-322.

9361 The Thermal Stability of Copper Phthalocyanine. Emil A. Lawton. *Journal of Physical Chemistry*, v. 62, Mar. 1958, p. 384.

The stability of Cu phthalocyanine for one hr. at 800 C in a closed system contrasts with the total decomposition of similar polymeric materials at 700 C under continuous pumping. This stability is attributed to a very slow rate of decomposition and is not a measure of the intrinsic thermal stability of this compound.

9362* (German.) Molecular Compounds With "Ansolvo" Acids. **Molekülverbindungen mit Ansolvosäuren. II.** Raman- and Ultrared Spectra of Heterocycles With Boron Trifluoride and Aluminum Chloride. **Raman- und Ultrarotspektren von Heterocyclen mit Boronfluorid und Aluminiumchlorid.** Horst Luther, Dieter Mootz, and Friedrich Radwitz. *Journal für Praktische Chemie*, v. 5, ser. 4, nos. 5-6, Feb. 1958, p. 242-259.

The fundamental frequency spectra of $AlCl_3$ and BF_3 compounds of pyridine, quinoline, and isoquinoline were measured.

9363 Effect of Diffusion on Reaction Efficiencies. R. P. Rastogi and T. P. Pandya. *Journal of Scientific & Industrial Research*, v. 17, sec. B, Jan. 1958, p. 5-11.

Reaction efficiencies in the static and flow systems for some complex reactions, such as side and reversible reactions are compared.

9364* (Russian.) Active Surface of Fused Iron Catalysts for CO and H_2 Synthesis. **O formirovanii aktivnoi poverkhnosti plavlenykh zheleznykh katalizatorov sinteza iz CO and H_2.** Iu. B. Kagan, A. N. Bashkirov, Iu. B. Kriukov, and S. M. Loktev. *Khimiia i Tekhnologiia, Toplivo i Masel*, v. 3, no. 3, Mar. 1958, p. 14-22.

Describes the behavior of fused Fe catalysts reduced at 1000 C, their activity, and the course of the reactions involved.

9365* (Russian.) Effect of the Acetyl-Group Content of Acetylcellulose on the Properties of Its Solutions. **Vliianie soderzhaniia atsetil'nykh grupp v atsetiltselliuloze na svoistva ee rastvorov.** V. P. Kharitonova and A. B. Pakshver. *Kolloidnyi Zhurnal*, v. 20, no. 1, Jan.-Feb. 1958, p. 110-117.

With change in the acetyl-group content, the viscosity of solutions in various solvents changes passing through a minimum when the content is 56.5 to 58.5%. The heats of solution depend on the ratio of acetyl and hydroxyl groups and decrease in value on passing from formic acid to acetone.

9366* (English.) **Potentiometric Titrations of a Polyelectrolyte.** Ichiro Sakurada, Masao Hosono, and Norio Ise. *Kyoto University. Memoirs of the Faculty of Engineering*, v. 19, no. 4, Oct. 1957, p. 402-407.

Study on titrations of polyvinyl alcohol partially acetalized with glyoxylic acid.

9367* (German.) Determining the Molecular Weight of Polyamides by Measuring the Light Scattering. **Zur Molekulargewichtsbestimmung an Polyamiden durch Lichtzerstreuungsmessungen.** H. G. Fendler and H. A. Stuart. *Makromolekulare Chemie*, v. 25, no. 3, Feb. 1958, p. 159-175.

Determining the mol. wt. of Perlon by light scattering in formic acid and with suitable additives. The polyelectrolytic behavior can be avoided by adding salt. Large complexes in centrifuged solutions dissolve at higher temperature but reappear if solutions cool.

9368 High Melting-Point Materials. *Missile Design and Development*, v. 4, Apr. 1958, p. 10.

Lists melting points of metals and compounds with acceptable nuclear characteristics for reactor use.

9369* The Nature of Bond Orbitals and the Origin of Potential Barriers to Internal Rotation in Molecules. Linus Pauling. *National Academy of Sciences, Proceedings*, v. 44, Feb. 1958, p. 211-216.

Potential barriers to internal rotation result from the interaction of adjacent hybrid bond orbitals.

9370 One-Electron *Versus* Two-Electron Transfer Processes in the Mechanism of Oxidation-Reduction Reactions in Solution. Joseph Weiss. *Nature*, v. 181, Mar. 22, 1958, p. 825-826.

Several examples of supposedly two-electron transfer processes which can be explained on the basis of one-electron transfers are given.

9371* Radiation and Oil Cracking. M. F. Hoare. *New Scientist*, v. 3, Mar. 27, 1958, p. 28-30.

An analysis of the potentialities of high energy radiation for bringing new flexibility to oil refining processes.

9372* The Nucleophilic Center in Amides. David Davidson. *New York Academy of Sciences, Transactions*, v. 20, no. 4, Feb. 1958, p. 316-323.

The O atom is generally the center of attack by electrophilic reagents such as acids, acid anhydrides, acid chlorides, the amides themselves, and alkyl halides.

9373* (English.) **Optical and Electrical Properties of Tin Oxide Films.** Kozo Ishiguro, Taizo Sasaki, Toshihiro Arai, and Isamu Imai. *Physical Society of Japan, Journal*, v. 13, Mar. 1958, p. 296-304.

Tin oxide is a conductor with *n*-type carriers; optical properties in the near infra-red region are influenced strongly by the properties of free carriers.

9374* The Structure of Rhodium. E. S. Bale. *Platinum Metals Review*, v. 2, no. 2, Apr. 1958, p. 61-63.

The mechanical properties, behavior towards mechanical working, and crystal structure of pure Rh were examined.

9375* (Polish.) Non-Ionic Surface Active Agents. **Niejonowe środki powierzchniowo-czynne.** Dominik Nowak. *Przemysł Chemiczny*, v. 37, no. 1, Jan. 1958, p. 15-19.

General properties and classification of surface-active agents. Typical chemical combinations from ethylene oxide and fatty or carbon-derived raw materials.

9376* Radiolysis of Liquid Methanol by Co^{60} Gamma-Radiation. Gisuke Meshitsuka and Milton Burton. *Radiation Research*, v. 8, no. 4, Apr. 1958, p. 285-297.

Effect of dose and iodine concentration on the yields of the various products and on the iodine disappearance. Effects of halide salts.

9377* (English.) **The Temperature Variation of Orthobaric Density Difference in Liquid-Vapor Systems. I. Normal Liquids. II. Water and Deuterium Oxide. III. Alcohols.** J. M. Costello and S. T. Bowden. *Recueil des Travaux Chimiques des Pays-Bas*, v. 77, no. 1, Jan. 1958, p. 28-46.

9378* (English.) **Thermodynamic Properties of Mixtures of Alkanes Differing in Chain Length. IV. Volumes of Mixing.** A. Desmyter and J. H. van der Waals. *Recueil des Travaux Chimiques des Pays-Bas*, v. 77, no. 1, Jan. 1958, p. 53-65.

The change in volume on mixing two alkanes of different mol. wt. was studied. A dilatometer permits determination of the volume of mixing as a function of composition over a wide range of concentrations in a single experiment.

9379* (English.) **Foam Stability. I. Structure and Stability of Foams.** A. J. DeVries. *Recueil des Travaux Chimiques des Pays-Bas*, v. 77, no. 2, Feb. 1958, p. 81-91.

A critical survey of factors governing the stability of foams with particular reference to the role of surface tension and the importance of Gibbs' effect of surface elasticity of thin liquid films.

9380* (French.) Infra-Red Dispersion in the Neighborhood of the R(2) Lines of the Hydrochloric Acid First Harmonic Band. **Dispersion infrarouge au voisinage des raies R(2) de la bande première harmonique de l'acide chlorhydrique.** François Legay. *Revue d'Optique Théorique et Instrumentale*, v. 37, no. 1, Jan. 1958, p. 11-17.

Investigation with a Michelson interferometer to which a grating spectrometer was added. Influence of the spectrometer slit widths.

9381* Hydrothermal Chemistry. A. J. Ellis and W. S. Fyfe. *Reviews of Pure and Applied Chemistry*, v. 7, no. 4, Dec. 1957, p. 261-316.

Covers experimental apparatus, fundamental properties of water at high temperatures and pressures, equilibrium in hydrate systems at high temperatures, solubility relations, high temperature conductance measurements, variation in pH, galvanic cells above 100 C, and technological applications of reactions in aqueous media above 100 C.

9382 The Catalytic Fission of the Carbon-Nitrogen Bond. II. The Reactions of Ethylamine and Hydrogen on Evaporated Metal Films. C. Kemball and R. L. Moss. *Royal Society, Proceedings*, v. 244, ser. A, Mar. 25, 1958, p. 398-410.

Reactions on Pt, W, Pd, Ni, Au, and Rh films.

9383* (German.) Osmotic Measurements on Organic Xanthates. **Osmotische Messungen an Organoxanthaten.** J. Schurz and W. Zimmerl. *Svensk Papperstidning*, v. 61, no. 6, Mar. 31, 1958, p. 157-161.

Measurements on diethylacetimido cellulose xantates in dimethylsulfoxide.

9384* (Norwegian.) Light Scattering as a Method Applied to Macromolecular Chemistry. **Lys-spredning som metode i makromolekylkjemien.** Arne Haug. *Tidsskrift for Kjemi, Bergvesen og Metallurgi*, v. 18, no. 3, 1958, p. 33-37.

General theory; anisotropy; polydispersion. Systems with several components; charged molecules; molecules of the same order of magnitude as the light wavelength; applications.

9385 (Russian.) Thermodynamic Functions of Pyramidal Molecules. Hydrides and Deuterides of Group V Elements. **Termodinamicheskie funktsii piramidal'nykh molekul. Gidridy i deiteridy elementov V gruppy.** V. N. Khlebnikova and V. P. Morozov. *Ukrainskii Khimicheskii Zhurnal*, v. 24, no. 1, 1958, p. 3-6.

Calculation of thermodynamic functions of the ammonia molecule. Reconsideration and completion of tables of thermodynamic properties of phosphine and arsine. Calculation of thermodynamic functions of ND_3, PD_3, AcD_3, SbH_3, and SbD_3 molecules between 298.2 and 1000 K.

9386* (German.) The Rate of the Reaction $2Al + AlCl_3 \rightarrow 3AlCl$. **Uber die Geschwindigkeit der Reaktion $2Al + AlCl_3 \rightarrow 3AlCl$.** W. Hirschwald and O. Knacke. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 11, no. 3, Mar. 1958, p. 99-104.

The equilibrium between liquid Al and its gaseous chlorides $AlCl_3$ and $AlCl$, is presented graphically and discussed. The rate of the reaction is measured at 670 to 830 C.

See also: **9188** (nonionic surface-active substances); **9636** (heat of combustion of thianthrene and succinic acid); **9847** (behavior of H in Fe); **10048** (microwave absorption in methyl halides); **10083** (reactivity ratios in sulfostyrenes).

COATINGS

9387 (Russian.) Effect of Ferric Oxide on the Viscosity of Enamels Containing or Devoid of Boron. **Vliianie okisi zheleza na viazkost' bornykh i bezbornykh emalei.** K. P. Azarov and S. B. Grechanova. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 2, Jan. 11, 1958, p. 348-350.

Determination of viscosity of commercial boric, non-boric, and titanic prime enamels in the region of softening. With an increase of ferric oxide content, viscosity of non-boric enamels increases, but viscosity of boric enamels decreases.

9388 Hydrogen Treating Process for Steel. J. H. Healy and J. D. Sullivan. *American Ceramic Society, Journal*, v. 41, Apr. 1958, p. 141-145.

Steel is exposed to cathodically generated H until a decrease in density and an increase in porosity is obtained. Upon the removal of a substantial portion of the H, glass may be applied to the steel and it will be free of high- and low-temperature hydrogen defects. This process permits the use of nonpremium steels, nonbubbly mill additions, and ground-coat compositions that have greater corrosion resistance than conventional ground coats.

9389* Alkali Blue. Lyle E. Squire. *American Ink Maker*, v. 36, Apr. 1958, p. 33 + 3 pages.

History, production, properties, forms, and uses of a versatile ink pigment having a wide range of shade, color cleanliness, and good stability.

9390* Protective Coatings Based on Bitumen. John Stanford. *Corrosion Prevention and Control*, v. 5, Mar. 1958, p. 62-64.

An evaluation of bitumens with reference to their versatility and ability to meet requirements of an ideal protective coating.

9391 Flame Spraying of Metals. D. E. J. Cunningham. *Corrosion Technology*, v. 5, Mar. 1958, p. 71-74.

Equipment and methods.

9392 Transparent Electrically Conductive Coating. E. R. Olson and E. H. Lougher. *Electrical Manufacturing*, v. 61, Mar. 1958, p. 143 + 4 pages.

A new procedure is described for low temperature deposition of a highly transparent, electrically conductive coating. Properties of the coatings may be controlled by varying proportions of the metals used, rate of evaporation, temperature, pressure, and O content of the high-vacuum processing atmosphere.

9393 The Effect of Temperature and Thickness on the Electrical Resistivity of Ceramic Coatings. Wm. H. Fischer. *Electrochemical Society, Journal*, v. 105, Apr. 1958, p. 201-203.

The electrical resistivity of ceramic insulating coatings less than 3 mils thick varies with thickness; variation of resistivity with temperature is normal.

9394* A Look at Today's Asphalt Pipe Enamels. II. Lloyd F. Bramble. *Gas*, v. 34, Apr. 1958, p. 27 + 2 pages.

Performance tests on asphalt coatings resulted in the development of a "super" enamel which has excellent adhesion, cohesion, flexibility, and resilience characteristics. Resists temperatures above 525 F for several days.

9395 Inhibition of Resin Acid Isomerization. Virginia M. Loeblich and Ray V. Lawrence. *Industrial and Engineering Chemistry*, v. 50, Apr. 1958, p. 619-620.

Isomerization can be inhibited by controlling acidity during processing. Partially neutralized resins from pine gum should find direct use as paper sizes and soaps, and as starting materials for making precipitated metal resinates and maleic-, fumaric-, or formaldehyde-modified resins.

9396 Vapor Transfer Through Barriers. Karl Kammermeyer. *Industrial and Engineering Chemistry*, v. 50, Apr. 1958, p. 697-702.

Includes data on 14 systems, covering water vapor, and inorganic and organic vapors in transport through barriers such as plastic films, paper, and silica and carbon powders, where the powders represent microporous barriers.

9397* Painting Hot Dip Galvanized Steel. J. F. H. van Eijnsbergen. *Industrial Finishing (London)*, v. 10, Mar. 1958, p. 34-36.

Some experiences with modern paints, and particularly Zn-rich paints with high percentages of Zn dust.

9398 Airless Spray Coating Practice. *Machinery Lloyd (Overseas Ed.)*, v. 30, no. 6, Mar. 15, 1958, p. 87-88.

Based on hot spraying at high pressures, the application of heat not only lowers viscosity, but builds up a vapor pressure which assists in atomization.

9399 The Sparcard Hard-Surfacing Process. *Machinery (London)*, v. 92, Mar. 21, 1958, p. 687-688.

A spark-machining process can be used to provide a very hard surface layer on tool tips and other parts which are subjected to severe wear in service.

9400 Protecting Metals at High Temperatures. Alfred F. Hofstatter. *Materials in Design Engineering*, v. 47, Apr. 1958, p. 115-119.

Ceramic coatings are particularly important because of their hardness and resistance to oxidation. Metallic coatings are characterized by their combination of wear and corrosion resistance. Special paints are easy to apply and can often be used at temperatures over 1000 F.

9401 Properties of Phenolic, Epoxy and Vinyl Coatings. *Materials in Design Engineering*, v. 47, Apr. 1958, p. 161 + 1 page.

Tabulated data on outstanding characteristics.

9402 Science for the Coatings Technologist. IX. Metallic Pigments. E. S. Beck. *Metal Finishing*, v. 56, Apr. 1958, p. 52 + 4 pages.

Leafing and non-leafing Al, metallics, and hammered finishes are discussed. (To be concluded.)

9403* Depositing Silver Coatings on Glass, Ceramic, Wood, Ivory and Similar Materials. Some Notes on Practical Experience. Elias Schore. *Metal Finishing Journal*, v. 4, no. 39, Mar. 1958, p. 80-82.

9404 Vapour Plating of Nickel. L. W. Owen. *Metal Industry*, v. 92, Mar. 21, 1958, p. 227-230.

Equipment and procedures; process variables; design considerations; coating properties.

9405* (French.) Considerations on the Formation of Mattes in Galvanizing Baths. **Considérations sur la formation des mattes dans les bains de galvanisation.** A. Herz. *Metallurgie*, v. 90, no. 3, Mar. 1958, p. 197-199.

Methods for minimizing waste of Zn. Effect of temperature. Use of fluxing salts.

9406* Development and Use of the 'Sand Grinder'. David G. Bosse. *Official Digest*, v. 30, Mar. 1958, p. 250-276.

Low cost milling equipment provides a strong dispersive plus mild grinding action. General aspects are discussed.

9407* The Evaluation of Acrylic, PVA, and Styrene-Butadiene Systems. *Official Digest*, v. 30, Mar. 1958, p. 295-343.

Papers on acrylic emulsions for paints; evaluation of PVA emulsion paint systems; styrene-butadiene exterior masonry paints; and TiO_2 in PVA emulsion paints.

9408* Microorganisms in Relation to Organic Coatings. I. Microorganisms and Test Procedures in the Assay of Preservatives and Mildew Inhibitors. Milton Goll. **II. Isolation and Identification of Microflora on Exterior Oil Paints.** Frederick M. Rothwell. **III. Attack of Linseed Oil and Linseed Oil Films by Microorganisms.** Richard T. Ross. **IV. Can and Film Preservation.** Eugene E. Wiese. **V. Preservatives in Industrial Maintenance Coatings.** Gerald Eisenschiml. **VI. Self-Sanitizing Paint Surfaces.** Paul F. Klens and Chester F. Koda. **VII. The Evaluation of Fungicides for Use in Paints.** Samuel Shapiro. *Official Digest*, v. 30, Apr. 1958, p. 364-430.

9409 Epoxidised Oils as Polyhydric Alcohols for Alkyd Manufacture. H. W. Chatfield. *Oil & Colour Chemists' Association, Journal*, v. 41, Apr. 1958, p. 301-310.

Use of epoxidised oils to yield products with pronounced gelling properties at relatively low temperatures by direct reaction with monomers, to accelerate production of resins of high viscosity, and to increase molecular size of resins.

9410 Some Aspects of Amino Coating Resins. F. Schollick. *Paint Technology*, v. 22, Mar. 1958, p. 81-83.

9411 Guide to Selection of Coal Tar Coatings for Protection of Metals Underground. II. N. T. Shideler. *Petroleum Engineer*, v. 30, Apr. 1958, p. D29-D31.

Cold applied coatings. Summary of selection considerations.

9412 Ultrasonic Atomization of Liquids. John N. Antonevich. Paper from "Proceedings of the National Electronics Conference 1957". v. XIII. p. 798-807. 1958. National Electronics Conference, Inc., Chicago. (TK161 N21p Vis.)

Suggests that the rupture of capillary waves in the film is the prime cause of atomization. High-speed motion pictures show sprays emanating from vibrating gas bubbles in particles from 5 to 500 μ in diameter. Under the best atomizing conditions at 20-kc, the particle diameters were 20 to 70 μ.

9413* (Polish.) Some Problems of Chemistry and Technology of Alkyd Resins. **Niektóre problemy chemii i technologii żywic alkidowych.** Zbigniew Jedliński. *Przemysł Chemiczny*, v. 37, no. 1, Jan. 1958, p. 12-15.

Effect of the choice of raw materials on the resin properties; fractionation and analysis.

9414* (Spanish.) Protection of Metals. Molten Bath Aluminum Coating. **Protección de metales. Recubrimiento con aluminio en baño fundido.** Manuel Serra. *Revista de Ciencia Aplicada*, v. 12, no. 1, Jan.-Feb. 1958, p. 31-42.

Technical advantages of Al coating. Critical survey of the different commercial processes used. Comparison with galvanized surfaces.

9415* (German.) The Influence of Welding Conditions on the Composition and Structural Constitution of Deposited Chrome-Hard Metal Alloys. **Der Einfluss der Schweissbedingungen auf die Zusammensetzung und Gefügeausbildung aufgeschweisster Chrom-Hartlegierungen.** Helmut Koch and Elmar Bernholz. *Schweissen und Schneiden*, v. 10, no. 3, Mar. 1958, p. 71-76.

9416 New Radioisotopic Method of Wear Evaluation of Floor Finishes. George J. Fuld, Richard C. Brogle, Melvin Fuld, Harry C. Broll, and Charles Pinchback. *Soap and Chemical Specialties*, v. 34, Apr. 1958, p. 93 + 3 pages.

Method utilizes a short half-life β-emitting isotope and requires only a routine survey meter.

9417* The New Resins for Treating White Cotton Goods. Hector C. Borghetty. *Textile World*, v. 108, no. 4, Apr. 1958, p. 89 + 8 pages.

Evaluates the application of various resins to textiles to improve wash-wear qualities.

See also: **9813** (wiredrawing coatings); **9901** (thickness measurement of Sn and Sb coatings); **9904** (nondestructive coatings thickness measurements).

CONTROL SYSTEMS, COMPUTERS, AND SYSTEMS ENGINEERING

9418 Automatic Digital Control. Digital Data-Control System for the Automatic Operation of Machine-Tools. Peter J. Farmer. *Aircraft Production*, v. 20, Apr. 1958, p. 150-161.

9419* Applying Magnetostrictive Actuation for Precise Linear Positioning. Lawrence Torn. *Automation*, v. 5, Apr. 1958, p. 73-76.

Precise motions are obtained by utilizing minute physical changes in an actuator subjected to a magnetic field.

9420* (Russian.) The Stability of Nonlinear Control Systems as Defined by Differential Equations of the Fifth and Sixth Order. **Ob ustoichivosti nelineinykh reguliruemykh sistem, opisyvaemykh differentsial'nymi uravneniiami piatogo i shestogo poriadka.** E. N. Rozenvasser. *Avtomatika i Telemekhanika*, v. 19, no. 2, Feb. 1958, p. 101-113.

Satisfactory conditions of stability for certain control systems were obtained with the aid of Lourie's theorem.

9421* (Russian.) Determination of Parameters of the Corrective Devices in Linear Servo-Systems Under Given Values of Their Generalized Parameters. **Opredelenie parametrov korektiruiushchikh ustroistv lineinykh slediashchikh sistem po zadannym znacheniiam ikh obobshchennykh parametrov.** M. M. Kreimerman. *Avtomatika i Telemekhanika*, v. 19, no. 2, Feb. 1958, p. 135-147.

9422* The Electronic Synthesis of Flexible Beam Behaviour. M. Squires and W. G. Hughes. *British Institution of Radio Engineers, Journal*, v. 18, Mar. 1958, p. 151-173.

Use of electronic analog computers to evaluate and display the vibrations of flexible beams and related structures.

9423 Digital Computer Components and Circuits. R. K. Richards. 511 pp. 1957. D. Van Nostrand Co., Princeton. (TK7888.3 R39d)

Basic engineering approaches related to digital techniques carefully organized for practical use, including a wide range of components and circuits of an experimental nature, a discussion of logical functions, digital storage, and advantages and disadvantages of the several approaches to design.

9424 Switching Reactors Combine Control Logic and Power Switching. Edgar V. Weir. *Electrical Manufacturing*, v. 61, Mar. 1958, p. 82 + 4 pages.

Standardized switching reactors with multiple control windings for static control of industrial equipment by operating motor contractors and valve solenoids directly in response to push-button and limit-switch signals without additional amplifiers or specialized power supplies.

9425 Direct Drive Amplifier for Two-Speed Servos. B. E. Orr. *Electronics* (Engineering Edition), v. 31, no. 11, Mar. 14, 1958, p. 146-147.

Servo amplifier uses input switching circuit and 3-stage feedback network.

9426 Servo Circuit Controls Artificial Heart. R. Schild and N. Wesson. *Electronics* (Engineering Edition), v. 31, no. 15, Apr. 11, 1958, p. 73-75.

Rotating oxygenator substitutes for lung while servo-controlled pumps simulate heart action. Error signal from capacitance transducer in oxygenator activates servo motors to maintain constant volume within the circulatory system as variable reluctance pickups monitor pressure.

9427* Reliability Improvement Through Redundancy at Various System Levels. B. J. Flehinger. *IBM Journal of Research and Development*, v. 2, no. 2, Apr. 1958, p. 148-158.

9428* A New Approach to Analog⇄Digital Conversion. Max Palevsky. *ISA Journal*, v. 5, Apr. 1958, p. 42-44.

Transistorized conversion system has no moving parts, is small in size, uses little power, and greatly reduces the number of data channels required in many engineering test and telemetering applications.

9429 Thermal Computers. George A. Gedney. *Missile Design and Development*, v. 4, Apr. 1958, p. 18-20.

Basic principles and applications of device using a transmitter, or heater to convert electrical energy to thermal energy, and a receiver, or sensor, to detect changes in temperature yeilding changes in resistance proportional to changes in input signal.

9430* Serial Computer Techniques. G. G. Scarrott. *Nuclear Instruments*, v. 2, no. 2, Feb. 1958, p. 101-108 + 1 plate.

9431* Information Handling Systems for Nuclear Measurements. D. Maeder. *Nuclear Instruments*, v. 2, no. 2, Feb. 1958, p. 130-135.

9432 Basic Binary Counting Circuits. Ed Bukstein. *Radio & TV News*, v. 59, May 1958, p. 48 + 3 pages.

An appraisal of the fundamental binary-counting flip-flop and how it is applied.

9433 Comparison of Several Methods for Obtaining the Time Response of Linear Systems to Either a Unit Impulse or Arbitrary Input From Frequency-Response Data. James J. Donegan and Carl R. Huss. *U. S. National Advisory Committee for Aeronautics, Report* 1324, 1957, 13 pp. (TL521 Un3r Vis.)

Includes application of the methods as flight-data-analysis techniques in predicting loads and motions of a flexible aircraft on the basis of simple calculations when the aircraft frequency response is known.

9434 Central Automatic Data Processing System. Bert A. Coss. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4212, Apr. 1958, 96 pp. (TL570 Un3t Vis.)

A series of papers describing a centralized system for the automatic recording and processing of pressures, voltages, frequencies, and other pertinent variables on magnetic tape in digital form.

See also: **9045** (star sensors for automatic navigation); **9625** (bibliography of sampled-data control systems); **9627** (translating machines); **9678** (electronic controls in machine design); **9764** (die casting machine control); **9998** (data processing in time-motion studies); **10203** (automatic refrigeration control); **10271** (automatic control of spot-welders).

ELECTRICAL ENGINEERING

9435 On the Measurements of Electrostatic Fields and Spark Energies. Niels Jonassen, P. Dam Larsen, and R. E. H. Rasmussen. *Acta Polytechnica (Electrical Engineering Series)*, v. 8, no. 2, 1957, 26 pp. (T1 Ac81 Vis.)

Possibilities and methods of measuring the energy of electric sparks from conductors and insulators. Data on an electrostatic fieldmeter based on a vibrating electrometer. Tests of the ability of electric sparks to ignite inflammable air- or air-dust mixtures.

9436* (Russian.) Use of Semiconductor Rectifiers in Automatic Electric Drive Systems. **O primenenii poluprovodnikovykh vypriamitelei v sistemakh avtomatizirovannogo elektroprivoda.** V. S. Kulebakin. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Tekhnicheskikh Nauk*, 1958, no. 2, Feb., p. 87-103.

Use of Si and Ge semiconductors for feeding choke coils and rectifiers in r.p.m. control of motors. Characteristics; vector curves; voltage change. Frequency control methods.

9437* Vapormatic Rheostat. *Automobile Engineer*, v. 48, no. 3, Mar. 1958, p. 108-110.

A compact and inexpensive automatic starter for slip-ring electric motors.

9438 Electrical Contact With Thermo-Compression Bonds. H. Christensen. *Bell Laboratories Record*, v. 36, Apr. 1958, p. 127-130.

Heat and pressure produce a bond between very thin electrical conductors and the semiconductor with very little contamination of the semiconductor material.

9439 High Dielectric Permeability of Niobates and Tantalates of Divalent Metals. G. A. Smolenskii, V. A. Isupov, and A. I. Agranovskaia. *Henry Brutcher Translation No.* 3939, 4 pp. (From *Doklady Akademii Nauk SSSR*, v. 108, no. 2, 1956, p. 232-235.) Henry Brutcher, Altadena, Calif.

Data on dielectric permeability, temperature coefficient between 68 and 175 F, and tangent of angle of dielectric losses.

9440 (English.) **Induced Overvoltage-Surges on Transmission Lines and Their Bearing on the Lightning Performance at Medium Voltage Networks.** R. Lundholm. *Chalmers Tekniska Högskolas Handlingar*, no. 188, 1957, 117 pp. (T4 C35t Contin.)

Basic equations of antenna theory; waves on a perfectly conducting wire; induced voltage-surge on a transmission line conductor, caused by a vertical stroke.

9441 (English.) **The Development and Decay of the Magnetic Flux in a Non-Delayed Telephone Relay. A Study of Telephone Relays.** Stig Ekelöf. *Chalmers Tekniska Högskolas Handlingar*, no. 192, 1957, 51 pp. (T4 C35t Contin.)

Investigates relays with a round core and a rectangular yoke, of the "L-armature" type. The armature is kept fixed and the magnet reluctances are assumed to be constant.

9442 Self-Generated Oscillations in the D-C Carbon Arc. II. The Hissing Arc and Radio-Frequency Oscillations. Bernard H. List and T. B. Jones. Paper from "Electric Arc and Resistance Welding". III. p. 209-217. 1952. American Institute of Electrical Engineers, New York. (TK4660 C76e Vis.)

The abrupt drop in voltage that occurs when the carbon arc begins to hiss in air, N, O, or H appears to be a result of the change of mechanism of supplying positive ions at the anode. There is no abrupt drop in inert gases. With metallic electrodes, there is no drop in voltage because the ionization potential of the metal is lower than that of the product formed.

9443 Synthetic-Fiber and Wool Felts, Their Design Characteristics and Uses. T. J. Gillick, Jr. *Electrical Manufacturing*, v. 61, Apr. 1958, p. 126 + 8 pages.

Difficult design problems in electrically energized equipment are solved by use of natural-wool, synthetic-fiber, and composite felts. Physical and chemical data charts and curves are presented.

9444* How to Improve Relay Reliability. Lawrence B. Kleiger. *Electronic Equipment Engineering*, v. 6, Apr. 1958, p. 37-40.

Tips for improving relay and relay-circuit reliability.

9445* (Czech.) Discharges in Subatmospheric Pressures and Their Utilization for High-Temperature Furnaces. **O výbojích za subatmosférických tlaků a jejich použití pro pec s vysokými teplotami.** Aleš Bláha. *Elektrotechnický Obzor*, v. 47, no. 3, Mar. 1958, p. 114-122.

High-temperature technique employed for attaining high discharge temperatures under pressures from 760 down to 10 mm. Hg in common commercial gases. Reduction of the pressure permits temperatures from 2000 to 4000 C. Development of a simplified theory of discharges under subatmospheric pressures, suitable for designing furnaces. Experimental measurements of the temperature and other characteristics of subatmospheric discharges in a mild vacuum.

9446* (Hungarian.) Calculation of Short Circuit Heating of Conductors. **A vezetők zárlati melegedésének számításáról.** Aurel Avramescu. *Elektrotechnika*, v. 50, nos. 10-12, Oct.-Dec. 1957, p. 392-400.

Precise valuation of heating is obtained by considering the temperature coefficient of materials in their normal state. Analytical and graphical methods.

9447* (Hungarian.) Switching Phenomena on Capacitors. **Kondenzátortelepek kapcsolási jelenségei.** Imre Benkó. *Elektrotechnika*, v. 50, nos. 10-12, Oct.-Dec. 1957, p. 429-437.

Prevention of dangerous currents and voltages by inserting protective resistances, induction coils in the circuit, or by employing disconnecting devices. Methods of calculating stresses.

9448* (German.) Determining the Leakage Current Strength of Insulation Materials in Large Scale Experiments. **Über die Bestimmung der Kriechstromfestigkeit von Isolierstoffen in Grosszahlversuchen.** Walter Claussnitzer and Viktor Siegel. *ETZ: Elektrotechnische Zeitschrift*, v. 79, Ausgabe A, no. 5, Mar. 1958, p. 144-149.

Behavior of the surface of the specimens. Dripping tests. Frequency distribution. Effect of temperature of the material.

9449* (German.) Factors Determining Dielectric Strength. **Über einige die Durchschlagfestigkeit bestimmende Einflüsse.** Wolfgang Ehrenberg. *ETZ: Elektrotechnische Zeitschrift*, v. 79, Ausgabe A, no. 5, Mar. 1958, p. 156-159.

Effect of preliminary voltage testing of paper condensers in relation to breakdown voltage. Effect of capacitance on the dielectric strength of roll-type condensers.

9450* High-Temperature Aircraft Wires. W. F. Horstman and H. L. Wilson. *Insulation*, v. 4, Apr. 1958, p. 36-41.

Various wires and insulations for use at very high temperatures are discussed.

9451* (German.) The Reactions of Hydrocarbons in an Electric Field. **Über Umsetzungen von Kohlenwasserstoffen im elektrischen Feld.** H. Luther and K. Mertlich. *Naturwissenschaften*, v. 45, no. 3, Feb. 1958, p. 57-58.

Measurements of dielectric strength and chemical stability of hydrocarbons.

9452* (Russian.) On the Theory of Ferromagnetic Superconductors. **K teorii ferromagnitnykh sverkhprovodnikov.** G. F. Zharkov. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*, v. 34, no. 2, Feb. 1958, p. 412-416.

Conditions of existence of superconducting state for massive uniform ferromagnetic samples possessing the form of ellipsoids of revolution. The direction of spontaneous magnetization forms an arbitrary angle, θ_0, with the direction of the external field parallel to the axis of revolution. Estimations show that the superconducting state can exist only for angles $\theta_0 = 10^{-2}$ or more.

See also: **9392** (transparent electrically conductive coating); **9393** (electrical resistance of insulating ceramic coatings); **9724** (circuit for a 3-phase thermal ore furnace); **9789** (magnetization and demagnetization in ferrosilicon); **10067** (moisture penetration in submarine telephone cables); **10252** (welding current supply systems).

ELECTROCHEMISTRY

9453* (Russian.) The Study of Internal Stresses in Metals in the Course of Electrodeposition by Means of a Disk Cathode With an Ohmic Selsyn Distributer. **Issledovanie vnutrennikh napriazhenii v metallakh v protsesse elektroosazhdeniia metodom diskovogo katoda s omicheskim datchikom.** M. Ia. Popereka and K. S. Frusin. *Akademiia Nauk Kazakhskoi SSR, Vestnik*, v. 14, no. 2, Feb. 1958, p. 84-91.

9454* (Russian.) Effect of the Composition of Galvanic Nickel-Cobalt Alloys on the Hydrogen Overvoltage in Alkali Solutions. **Vliianie sostava gal'vanicheskikh splavov nikel'-kobal't na vodorodnoe perenapriazhenie v rastvorakh shchelochi.** G. P. Loshchinina and A. M. Murtazaev. *Akademiia Nauk Uzbekskoi SSR, Doklady*, 1958, no. 2, p. 39-43.

A study showing that in most alloys, according to their composition, the potentials of H separation vary within the limits of their values for pure components. In pure electrolytic Ni the overvoltage is significantly higher than in Co.

9455* Industrial Applications of A. C. Polarography. R. L. Faircloth and D. J. Ferrett. *British Institution of Radio Engineers, Journal*, v. 18, Mar. 1958, p. 143-149.

Principles of the square-wave polarograph. Recent work on the pulse and R.F. polarographs. Concentrations of 1 in 10,000,000 can be measured.

9456* (Czech.) Polarographic Current Controlled by the Dissociation of an Electro-Inactive Substance Into Electro-Active and Electro-Inactive Compounds. **Polarografický proud řízený disociací elektroinaktivní sloučeniny na látku elektroaktivní a látku elektroinaktivní.** Jiří Čížek, Jiří Koryta, and Jaroslav Koutecký. *Chemické Listy*, v. 52, no. 2, Feb. 1958, p. 201-213 + 1 plate.

Calculation of instantaneous and average limit value of polarographic currents for cases where the depolarizer A forms from the reaction $B \rightleftarrows A + C$, provided that the chemical reaction is very fast. Experimental investigation of instantaneous and average currents of a Cd complex of nitrilotriacetic acid and their evaluation by means of the developed theory.

9457 An Investigation of Some New Cathode Depolarizer Materials. A. B. Tripler, Jr. and L. D. McGraw. *Electrochemical Society, Journal*, v. 105, Apr. 1958, p. 179-183.

The electrochemical characteristics of $MnPO_4$, $BaFeO_4$, and chloranil were investigated. The first two furnish cathodes which can be discharged at 200 ma/in.^{2} without severe polarization. Maximum nonpolarizing currents for the $MnPO_4$ are discussed in terms of the surface area of carbon admixed with it to form cathodes.

9458 Factors Affecting Residual Stress in Electrodeposited Metals, A Critical Evaluation. Joseph B. Kushner. *Metal Finishing*, v. 56, Apr. 1958, p. 46-51.

Theories and experimental techniques. Relationship between residual stress and deposit thickness. (To be continued.)

9459 Service Blistering of Plated Zinc Alloy Die-Castings. V. E. Carter and J. Edwards. *Metal Industry*, v. 92, no. 10, Mar. 7, 1958, p. 191 + 2 pages.

Effect of thickness of the Cu and Ni deposits.

9460* Platinum-Faced Titanium for Electrochemical Anodes. A New Electrode Material for Impressed Current Cathodic Protection. J. B. Cotton. *Platinum Metals Review*, v. 2, no. 2, Apr. 1958, p. 45-47.

If a small piece of Pt foil or wire is spot-welded to Ti anodes, most of the current passes out through the Pt and the Ti is uncorroded.

9461* Bright Nickel Plating. III. Solution Control. D. J. Fishlock. *Product Finishing*, v. 11, Mar. 1958, p. 87-101.

Control of pH, contaminants, and addition agents. Vat control. Solution purification.

9462* Electroplating of Screws and Other Small Parts. III. Werner Peters. *Wire*, no. 33, Feb. 1958, p. 19-24.

Calculating the thickness of the deposit.

9463* (Russian.) Passivation of Zinc Electrodes in Galvanic Elements With an Alkali Electrolyte. **Passivirovanie tsinkovogo elektroda v gal'vanicheskikh elementakh so shchelochnym elektrolitom.** Z. Ia. Nikitina. *Zhurnal Prikladnoĭ Khimii*, v. 31, no. 2, Feb. 1958, p. 218-226.

Use of KOH for passivation of Zn anodes. Effect of temperature and concentration.

9464* (Russian.) Behavior of Oxide-Graphite Potassium Electrodes During Electrolysis of Molten Chlorides. **Povedenie okisno-ugol'nykh elektrodov kal'tsiia pri elektrolize rasplavlennykh khloridov.** M. V. Smirnov, S. F. Pal'guev, and Iu. N. Krasnov. *Zhurnal Prikladnoĭ Khimii*, v. 31, no. 2, Feb. 1958, p. 226-233.

See also: **9203** (electrolysis with an electronic coulometer); **9237** (oscillographic polarography in quantitative analysis); **9403** (Ag plating of non-metallic materials); **9699** (exposure test on electrodeposited Ni with Cr); **9737** (electrolytic buffing treatment); **9740** (electrolytic descaling of Ti); **9741** (use of chelating agents in plating); **9743** (effect of oxide films on electroplate); **9781** (electrolytic boronizing); **9899** (coating thickness measurement).

ELECTRONICS

9465 (English.) **Some Applications of the Isometric Circle Method to Impedance Transformations Through Lossless Two-Port Networks.** E. Folke Bolinder. *Acta Polytechnica (Electrical Engineering Series)*, v. 8, no. 6, 1957, 22 pp. (T1 Ac81 Vis.)

These transformations are shown to be of a type called "non-loxodromic". In this case the isometric circle method simply consists of an inversion in the isometric circle of the direct transformation, followed by a reflection in the symmetry line of the two isometric circles of the direct and inverse transformations.

9466* (Russian.) Effect of Surface Structure on the Sign of Conductivity of AlSb and InSb. **Vliianie poverkhnosti na znak provodimosti AlSb i InSb.** V. F. Synorov. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 3, Jan. 21, 1958, p. 483-484.

Effect of surface grain size on conduction characteristics.

9467* (Russian.) An Electronic-Acoustic Converter. **Issledovanie elektronno-akusticheskogo preobrazovatelia.** Iu. B. Semennikov. *Akusticheskii Zhurnal*, v. 4, no. 1, Jan.-Mar. 1958, p. 73-84.

Mechanism. Calculation of sensitivity. Optimum number of lines of image dissociation and relation with parameters of the converter. Calculation of the threshold pickup.

9468* (French.) Recording and Modern Electroacoustics Magnetic Recording. **Enregistrement et électroacoustique moderne enregistrement magnétique.** André Didier. *Annales des Telecommunications*, v. 13, nos. 1-2, Jan.-Feb. 1958, p. 9-15.

Advantages and limitations of magnetic recording. Characteristics of the recording processes. Technical progress leading to the tape magnetophone.

9469 New Breed of Microwave Tubes Spurs Radar, ECM, Scatter Designs. James Holahan. *Aviation Age*, v. 29, no. 4, Apr. 1958, p. 22 + 10 pages.

A survey of forward and backward wave tube designs and characteristics.

9470 Tests Predict Avionics Field Failures. Philip J. Klass. *Aviation Week*, v. 68, Apr. 21, 1958, p. 129 + 2 pages.

New component failure rate data obtained from more than one million hours of tests on over 50,000 avionic equipments now makes possible accurate prediction of equipment failure in field use.

9471 A Proposed High-Frequency, Negative-Resistance Diode. W. T. Read, Jr. *Bell System Technical Journal*, v. 37, no. 2, Mar. 1958, p. 401-446.

Analyzes a proposed semiconductor diode designed to operate as an oscillator in a suitable microwave cavity. Frequency would be in the range from 1 to 50 kmc.

9472* Frequency Modulation by Inductance Variation. A Magnetically-Stable Ferrite Modulator. F. Slater. *British Institution of Radio Engineers, Journal*, v. 18, Mar. 1958, p. 189-204.

9473 The Indium-Selenium System. J. C. Brice, P. C. Newman, and H. C. Wright. *British Journal of Applied Physics*, v. 9, Mar. 1958, p. 110-111.

Polycrystalline specimens of In_2Se_3, InSe, and In_2Se were prepared by direct fusion. Electrical and physical measurements indicated a phase change in In_2Se_3 at 196 C.

9474 (English.) **The Electromagnetic Interaction Between Two Crossing Electron Streams. I.** G. H. Joshi. *Chalmers Tekniska Högskolas Handlingar*, no. 183, 1957, 29 pp. (T4 C35t Contin.)

The interaction between an infinitely extended velocity modulated z-stream and an infinitely extended x-stream has been studied in detail. It is shown that in addition to the space charge waves, there are electromagnetic waves present, which have typical ionospheric similarities. The ionospheric reflection level depends upon the current density of the longitudinal z-stream. Electromagnetic waves show a "resonance" phenomenon when the drift velocity of the stream approaches the phase velocity of the wave in the direction of the drift.

9475 (English.) **Large Signal Behaviour of Directly Heated Thermistors. A Study of Thermistor Circuits.** S. Ekelöf, N. Björk, and R. Davidson. *Chalmers Tekniska Högskolas Handlingar*, no. 185, 1957, 31 pp. (T4 C35t Contin.)

The purpose is to show how large amplitude thermistor problems can be handled by methods, based on the thermistor equation, and to examine the validity of these methods by comparison with experimental results. This involves a test of the thermistor equation itself in large amplitude problems.

9476 (English.) **The Equivalent Transmission Line of a Linear Four-Terminal Network. Calculations With Cascade-Connected Four-Terminal Networks.** Carl G. Aurell. *Chalmers Tekniska Högskolas Handlingar*, no. 187, 1957, 39 pp. (T4 C35t Contin.)

9477 Ferroelectrics as Solid-State Devices. Richard A. Fotland. *Electrical Manufacturing*, v. 61, Mar. 1958, p. 130-137.

Summary of types, properties, mechanisms and applications of nonlinear dielectrics as capacitors, transducers, resonant and nonresonant amplifiers, ferroelectroresonant switches, and memory devices.

9478 Selenium Rectifier Selection and Circuit Design. Richard C. Hitchcock. *Electrical Manufacturing*, v. 61, Apr. 1958, p. 109-119.

Single-phase half-wave and bridge circuits with common load components are analyzed, with current and voltage behavior shown graphically.

9479* Molded Printed Circuits Save Missile Space. Bruce B. Greenfield. *Electronic Equipment Engineering*, v. 6, Apr. 1958, p. 45-46.

Development of epoxy-glass cloth for printed-circuit bases permits use of space-saving configurations with additional high electrical and physical strength.

9480* Limited-Gain Operational Amplifiers. A. W. Keen. *Electronic & Radio Engineer*, v. 35, Apr. 1958, p. 141-143.

The effect of finite gain in an operational amplifier can be allowed for by assuming that the amplifier gain is infinite and then adding fictitious circuit elements to the feedback network to reduce the gain to the value actually obtained. Equivalent networks for some practical single-stage amplifiers are given.

9481* Scattering of Electromagnetic Waves by Long Cylinders. Albert W. Adey. *Electronic & Radio Engineer*, v. 35, Apr. 1958, p. 149-158.

The field scattered by both a metal and a dielectric cylinder, when excited by an electromagnetic wave propagating in a direction normal to the cylinder axis, is discussed for both plane-wave and cylindrical-wave incidence. The radius of the cylinder is comparable with the free-space wavelength of the incident wave.

9482 Fast Transistor Relay. Dorrance L. Anderson. *Electronics* (Engineering Edition), v. 31, no. 11, Mar. 14, 1958, p. 145.

Push-pull switching unit capable of handling up to 10 amp. has a rise time of 50 μ sec.

9483 Solid-State Thyratron Switches Kilowatts. R. P. Frenzel and F. W. Gutzwiller. *Electronics* (Engineering Edition), v. 31, no. 13, Mar. 28, 1958, p. 52-55.

Ability of the Si controlled rectifier to switch kilowatts of power in microseconds opens wide fields of application.

9484 Environmental Testing of Electronic Equipment. Michael F. Tomaino. *Electronics* (Engineering Edition), v. 31, no. 13, Mar. 28, 1958, p. 59-74.

The latest testing techniques and facilities.

9485 Preventing Equipment Vibration Failures. F. B. Safford and W. S. Inouye. *Electronics* (Engineering Edition), v. 31, no. 15, Apr. 11, 1958, p. 92-94.

Trial-and-error construction is avoided by accurate prediction of component fragility.

9486 Designing Transistor A-F Power Amplifiers. Marvin B. Herscher. *Electronics* (Engineering Edition), v. 31, no. 15, Apr. 11, 1958, p. 96-99.

High-power transistor audio amplifiers operate over ambient temperature range of −10 to +50 C.

9487* (Russian.) Regeneration and Neutralization of Cascades in Semiconductor Triodes. **O regeneratsii i neitralizatsii kaskadov na poluprovodnikovykh triodakh.** A. A. Rizkin. *Elektrosviaz'*, v. 12, no. 2, Feb. 1958, p. 12-19.

Critical survey of literature. Definition of regeneration or internal feedback and of the coupling between the input and output stages.

9488* (Russian.) Co-Phase Band Short-Wave Antenna With an Aperiodic Reflector. **Sinfaznaia diapazonnaia korotkovolnovaia antenna s aperiodicheskim reflektorom.** G. Z. Aizenberg, V. D. Kuznetsov, and L. K. Olifin. *Elektrosviaz*, v. 12, no. 3, Mar. 1958, p. 21-28.

Results of theoretical and experimental work for selecting dimensions for aperiodic reflectors. Properties of the antenna in vertical and horizontal planes.

9489* (Czech.) Design of Germanium Powder Rectifiers. **Konstrukce výkonových germaniových usměrňovacích ventilů.** Albert Kloss. *Elektrotechnický Obzor*, v. 47, no. 3, Mar. 1958, p. 149-153.

Problems encountered in valve design, particularly from the viewpoint of heat discharge and protection of the diodes against moisture. Effect of temperature on the inverse voltage and temperature increase in a Ge diode in consequence of losses caused by forward and inverse currents. Individual types of valve design, both air- and water-cooled.

9490* (German.) Some Criteria for the Thermal Stability of Transistors. **Einige Kriterien der thermischen Stabilität von Transistoren.** F. Weitzsch. *Frequenz*, v. 12, no. 3, Mar. 1958, p. 65-71.

Conditions under which thermal instability may occur in circuits and the use of stabilization methods.

9491* On the Statistical Mechanics of Impurity Conduction in Semiconductors. P. J. Price. *IBM Journal of Research and Development*, v. 2, no. 2, Apr. 1958, p. 123-129.

The statistical mechanics of the impurity electron states for a semiconductor with a low density of donors, and a small amount of acceptor compensation is analyzed.

9492* Reliability Improvement by the Use of Multiple-Element Switching Circuits. W. E. Dickinson and R. M. Walker. *IBM Journal of Research and Development*, v. 2, no. 2, Apr. 1958, p. 142-147.

For operating periods which are short compared to the mean time to failure of the elements, a substantial increase in reliability can be obtained by using redundant elements.

9493 A Traveling-Wave Ferromagnetic Amplifier. P. K. Tien and H. Suhl. *I.R.E. Proceedings*, v. 46, Apr. 1958, p. 700-706.

Theory of parametric amplifier in which amplification of signal power in the forms of growing waves is obtained in a propagating structure which is partially or totally embedded in a ferromagnetic medium.

9494 A Gallium Arsenide Microwave Diode. D. A. Jenny. *I.R.E. Proceedings*, v. 46, Apr. 1958, p. 717-722.

Gallium arsenide is potentially superior to Ge and Si in point contact diodes. It shows a lower mixer conversion loss and operates at higher temperatures.

9495 Some Applications of Ferrites to Microwave Switches, Phasers, and Isolators. A. C. Brown, R. S. Cole, and W. N. Honeyman. *I.R.E. Proceedings*, v. 46, Apr. 1958, p. 722-727.

9496 IRE Standards on Piezoelectric Crystals: Determination of the Elastic, Piezoelectric, and Dielectric Constants—The Electromechanical Coupling Factor, 1958. *I.R.E. Proceedings*, v. 46, Apr. 1958, p. 764-778.

9497* Analysis and Synthesis of Magnetic Yokes Using Rotating Probes. Henry S. Vasilevskis. *IRE Transactions on Broadcast and Television Receivers*, v. BTR-4, no. 2, Mar. 1958, p. 74-87. (TK1 In6.6b Vis.)

Yoke-field analyzer furnishes information about the magnetic-field distribution in yokes, centering devices, color-purity magnets, focusers, and similar components.

9498 The "Thyristor" — A New High-Speed Switching Transistor. C. W. Mueller and J. Hilibrand. *IRE Transactions on Electron Devices*, v. ED-5, no. 1, Jan. 1958, p. 2-5. (TK1 In6.6ed Vis.)

Device is capable of switching times of the order of 100 m μ sec. and has a low sustaining voltage, of the order of ½ v at 100 ma. Fabrication and alignment are simple.

9499 Germanium Power Switching Devices. J. Philips and H. C. Chang. *IRE Transactions on Electron Devices*, v. ED-5, no. 1, Jan. 1958, p. 13-18. (TK1 In6.6ed Vis.)

Two-terminal and three-terminal Ge power switching devices utilize a metal semi-conductor contact as an electron injector in a multijunction device. Principles of operation, fabrication techniques, and electrical characteristics are discussed.

9500* Developments in Transistor Electronics. L. B. Valdes. *Journal of Electronics and Control*, v. 4, no. 1, Jan. 1958, p. 1-16.

Review of design theory of point-contact and junction transistors. Selected examples illustrate the small- and large-signal properties of junction transistors. These phenomena are related to the theory of p-n junctions.

9501* On Carrier Accumulation, and the Properties of Certain Semiconductor Junctions. J. B. Gunn. *Journal of Electronics and Control*, v. 4, no. 1, Jan. 1958, p. 17-30.

A junction between relatively pure and impure regions of a semiconductor of uniform conductivity type possesses a degree of impermeability to minority carriers which should permit carrier accumulation to be observed in the lightly doped section.

9502* Avalanche Multiplication and Electron Mobility in Indium Antimonide at High Electric Fields. A. C. Prior. *Journal of Electronics and Control*, v. 4, no. 2, Feb. 1958, p. 165-169.

The current-voltage characteristics of InSb was measured up to a field of 800 volts/cm. Avalanche multiplication was found to occur at fields above 150 volts/cm. No variation of electron mobility was found.

9503* Transistors in Nuclear Instruments. E. Baldinger. *Nuclear Instruments*, v. 2, no. 2, Feb. 1958, p. 193-202.

Equivalent circuit and some properties of transistors; temperature dependence of transistor parameters; some simple circuits.

9504 Magnetic Field Effects on Electron Populations in Semiconductors. P. T. Landsberg. *Physical Society, Proceedings*, v. 71, Jan. 1958, p. 69-76.

A calculation of the change in population of the states of the conduction band when a magnetic field is applied.

9505 The Characteristic Temperature and Effective Electron Mass for Conduction Processes in Cadmium Oxide. R. W. Wright and J. A. Bastin. *Physical Society, Proceedings*, v. 71, Jan. 1958, p. 109-116.

Measurements of the Hall effect, resistance, magnetoresistive effect, and thermoelectric power were made for over 50 specimens prepared by sintering compressed powder blocks of CdO.

9506 Some Properties of Semiconducting Indium Phosphide. W. N. Reynolds, M. T. Lilburne, and R. M. Dell. *Physical Society, Proceedings*, v. 71, Mar. 1958, p. 416-421.

9507 Galvanomagnetic Effects in n-Type Bismuth Telluride. J. R. Drabble, R. D. Groves, and R. Wolfe. *Physical Society, Proceedings*, v. 71, Mar. 1958, p. 430-443.

The resistivity, Hall coefficients, and low field magnetoresistance coefficients associated with current flow in the cleavage planes were measured at 77 K.

9508* Transistorizing Radio Equipment. F. Vinton Long. *Pipe Line News*, v. 30, Apr. 1958, p. 31-34.

Why, where, when, and how to use transistors in communication systems.

9509 Proceedings of the National Electronics Conference, 1957. v. XIII. 1066 pp. 1958. National Electronics Conference, Inc., Chicago. (TK161 N21p Vis.)

Papers deal with transistor circuits, communications, servomechanisms, semiconductor applications, microwaves, radio astronomy, radar, computers, instrumentation, and network synthesis.

9510 The Tecnetron, Competitor to the Transistor? E. Aisberg. *Radio-Electronics*, v. 29, May 1958, p. 60-61.

Neither spacistor nor transistor, this new semiconductor triode shows great promise for U.H.F. Its transconductance increases with frequency.

9511 Hollow-Cathode Glow Discharge in Mercury Vapor. K. G. Hernqvist. *RCA Review*, v. 19, no. 1, Mar. 1958, p. 35-48.

Analysis based on an energy balance equation for the glow plasma indicates that plasma densities in excess of 10^{13} per cc. may be attained in this discharge.

9512 Large-Area Germanium Power Transistors. B. N. Slade and Jane Printon. *RCA Review*, v. 19, no. 1, Mar. 1958, p. 98-108.

A discussion of work leading to further extension of the high-current and power performance of p-n-p and n-p-n Ge power transistors. This performance has been obtained principally through an increase in junction area, but also through application of improved alloying and diffusion techniques.

9513 Considerations Affecting the Rise and Decay of Cathode Currents in Receiving Tubes. Edward R. Schrader. *RCA Review*, v. 19, no. 1, Mar. 1958, p. 109-127.

Curves showing the rise and decay of cathode current resulting from the application and removal of heater power in receiving tubes are analyzed to determine the dependence of these curves upon various tube properties.

9514* Use of Printed-Wiring Techniques in the Development of Electronic Circuits. F. C. Hallber, H. H. Levy, and C. J. Creveling. *Report of NRL Progress*, Feb. 1958, p. 9-14.

9515 Use of Operational Amplifiers in the Measurement of Transistor Parameters. William C. Hazel. *Review of Scientific Instruments*, v. 29, Mar. 1958, p. 235-237.

Method is based on the current-controlling and current-measuring functions which may be performed by the amplifiers.

9516* (Italian.) Radio-Signal Reception From the Satellite "Sputnik I". **Intercettazione di segnali radio emessi dal satellite "Sputnik I".** Pier Francesco Checcacci, Vera Russo, and Cesare Carreri. *Ricerca Scientifica*, v. 27, no. 11, Nov. 1957, p. 3252-3260.

Description of apparatus and methods used. Recording the pulse signals and examination with oscilloscope. Variations of the radial velocity evaluated from the Doppler effect, based on the continuous wave sent.

9517* Data Transmission Testing Set. J. Edwin Boughtwood and Thomas A. Christie, Jr. *Western Union Technical Review*, v. 12, no. 2, Apr. 1958, p. 51-57.

All-electronic transistorized testing set will measure bias distortion, characteristic distortion, and peak fortuitous distortion at transmission speeds from 200 to 1400 binary pulses per sec.

9518* Transistor Television Circuits. I. Synchronizing Separators and Timebase Oscillators. J. N. Barry and G. W. Secker. *Wireless World*, v. 64, Apr. 1958, p. 154-158.

(To be concluded.)

9519* (Russian.) Relation Between the "Forbidden Zone" Width and Composition of CdS-CdSe Solid Solutions. **O zavisimosti shiriny zapretnoi zony ot sostava v tverdykh rastvorakh CdS-CdSe.** P. Iu. Khansevarov, S. M. Ryvkin, and I. N. Ageeva. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 3, Mar. 1958, p. 480-483.

Preparation of polycrystalline mixed layers of CdS-CdSe. Study of photoeffect and lattice structure as functions of the ratio between these compounds.

9520* (Russian.) Effect of Degeneration on the Efficiency of Semiconductor Thermoelectric Cells. **O vliianii vyrozhdeniia na effektivnost' poluprovodnikovykh termoelementov.** T. S. Stavitskaia and L. S. Stil'bans. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 3, Mar. 1958, p. 484-488.

Comparison of theoretical and experimental data.

9521* (Russian.) Method of Solving Problems of Electromagnetic Wave Diffraction on Ideally Conducting Flat Screens Based on the Study of Currents Induced on Shadow Screens. **Metod resheniia zadach diffraktsii elektromagnitnykh voln na ideal'no provodiashchikh ploskikh ekranakh, osnovannyi na izuchenii navodimykh na ekranakh tenevykh tokov. I.** General Fundamentals of the Method. **Obshchie osnovy metoda. II.** Diffraction on a Semiplane and on a Plane With an Infinite Straight-Line Slit. **Diffraktsiia na poluploskosti i na ploskosti s bezgranichnoi priamolineinoi shchel'iu.** G. A. Grinberg. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 3, Mar. 1958, p. 542-568.

9522* (Russian.) Secondary Diffraction of Electromagnetic Waves on a Disk. **Vtorichnaia diffraktsiia elektromagnitnykh voln na diske.** P. Ia. Ufimtsev. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 3, Mar. 1958, p. 583-591.

Expressions for a field dispersed by a disk were obtained. Dispersion characteristics were calculated and compared with experimental data.

See also: **9155** (permittivity of $BaTiO_3$ ceramics); **9350** (thermistor detectors in gas chromatography); **9436** (semiconductors in electric controllers); **9582** (scattering of radio waves in the ionsphere); **9583** (forecasting of disturbed H.F. communications); **9584** (VLF ionospheric propagation); **10011** (sound reproducing systems); **10017** (potential distribution in p-n transitions); **10030** (electric fields and waves); **10043** (photoelectric devices).

ENGINEERING ECONOMICS

9523 New Sources of Energy and Economic Development. Solar Energy, Wind Energy, Tidal Energy, Geothermic Energy and Thermal Energy of the Seas. 150 pp. 1957. United Nations Department of Economic and Social Affairs, New York. (HD9685 Un2.2n Over.)

Characteristic features and methods of using these energy sources, particularly for the production of electric power, are discussed along with major development and utilization problems. A selected annotated bibliography of 480 references is included.

9524 Pulp, Papr and Board Economic Review. Wallace H. Pederson. *Paper Mill News*, v. 81, no. 16, Apr. 21, 1958, p. 32 + 4 pages.

9525* Production Handbook. Gordon B. Carson, editor. 2nd Ed. Sections individually paged. 1958. Ronald Press Co., New York. (TS155 C23p2 Ref.)

An authoritative presentation of the organization and principles, systems and procedures, and specialized techniques proven outstanding in achieving greater productivity and reduced costs.

See also: **9590** (spodumene resources in North America).

FLUID MECHANICS

9526* Longitudinal and Transverse Diffusion in Granular Deposits. G. de Josselin de Jong. *American Geophysical Union, Transactions*, v. 39, no. 1, Feb. 1958, p. 67-74.

The pore system of a packed bed is represented by a system of canals in order to permit probability computations for a foreign particle carried by the pore liquid movement to arrive at a certain place in a certain time.

9527 Distribution of Eddy Viscosity and Mixing Length in Smooth Tubes. R. R. Rothfus, D. H. Archer, and K. G. Sikchi. *A.I.Ch.E. Journal*, v. 4, no. 1, Mar. 1958, p. 27-32.

Profiles of eddy viscosity and Prandtl mixing length in fluids flowing steadily and isothermally in smooth tubes were calculated from the velocity data of several investigators for Reynolds numbers between 1.2×10^3 and 3.2×10^6.

9528 Convective Heat Transfer From High-Temperature Air Inside a Tube. Herbert E. Zellnik and Stuart W. Churchill. *A.I.Ch.E. Journal*, v. 4, no. 1, Mar. 1958, p. 37-42.

The local and over-all rate of heat extraction from air in turbulent flow in tubes can be predicted from previous correlations for low-temperature differences provided that viscosity and the thermal conductivity are evaluated at the bulk temperature.

9529 Natural-Convection Heat Transfer in Regions of Maximum Fluid Density. R. S. Schechter and H. S. Isbin. *A.I.Ch.E. Journal*, v. 4, no. 1, Mar. 1958, p. 81-89.

Two mechanisms of convective heat transfer are involved.

9530 Rates of Flow Through Microporous Solids. E. R. Gilliland, R. F. Baddour, and J. L. Russell. *A.I.Ch.E. Journal*, v. 4, no. 1, Mar. 1958, p. 90-96.

Rates of flow of pure gases were studied as a function of pressure level, pressure drop, and temperature for flow through ⅛-in. diameter cylindrical plugs of activated carbon and of unsintered Vycor glass.

9531* Measurements of Turbulence in a Plane Jet of Air by the Diffusion Method and by the Hot-Wire Method. B. G. Van der Hegge Zijnen. *Applied Scientific Research, Sec. A, Mechanics, Heat, Chemical Engineering, Mathematical Methods*, v. 7, no. 4, 1958, p. 293-313.

Deals with research into the diffusion of locally generated heat and locally injected H in a plane jet of air issuing with an initial velocity of 4000 cm. per sec. from a slit 0.5 cm X 10 cm and in a plane jet of air issuing with an initial velocity of 2000 cm. per sec. from a slit 1 cm X 25 cm.

9532 Heat Transfer to Fluids With Low Prandtl Numbers for Flow Across Plates and Cylinders of Various Cross Section. R. J. Grosh and R. D. Cess. *ASME, Transactions*, v. 80, no. 3, Apr. 1958, p. 667-676.

9533 Experimental Velocity and Temperature Profiles for Air in Turbulent Pipe Flow. C. A. Sleicher, Jr. *ASME, Transactions*, v. 80, no. 3, Apr. 1958, p. 693-704.

The ratio of eddy diffusivity for heat to that for momentum, calculated from measured velocity and temperature profiles of air in fully developed flow in a pipe at uniform wall temperature, was found to vary with Reynolds number and position.

9534 Heat Transfer to Supercritical Water. N. L. Dickinson and C. P. Welch. *ASME, Transactions*, v. 80, no. 3, Apr. 1958, p. 746-752.

Heat-transfer coefficients for supercritical water are presented for flow in an electrically heated stainless-steel tube having an inside diameter of 0.300 in. Bulk fluid temperatures were varied from 220 to 1000 F at 4500 psi, and over a more limited temperature range at 3500 psi.

9535 Temperature and Pressure Corrections to be Applied to the Shielded Hot Wire Anemometer at Speeds for Which Natural Convective Cooling is Negligible. C. F. Cowdrey. *British Journal of Applied Physics*, v. 9, Mar. 1958, p. 112-116.

9536* Three-Dimensional Investigation of Flow in Centrifugal Impeller With Straight-Radial Blades. Kunio Fujie. *Bulletin of JSME*, v. 1, no. 1, Jan. 1958, p. 42-49.

9537* Experiments on the Surging of a Blower. Yoshinori Shimoyama and Tadaya Ito. *Bulletin of JSME*, v. 1, no. 1, Jan. 1958, p. 57-64.

Considers effects of dimensions of the pipe-line, tank, and accessories on the surging, and the relation between the form of the characteristic curve and the surging.

9538 (French.) New Method for the Approximate Calculation of the Laminary and Turbulent Boundary Layers in Compressible Flow. **Nouvelle méthode approchée de calcul des couches limites laminaire et turbulente en écoulement compressible.** Alfred Walz. *France. Ministère de l'Air, Publications Scientifiques et Techniques*, no. 336, 1957, 48 pp. (TL502 F84.1p Vis.)

Calculation of the general case of compressible flow with a pressure gradient. Behavior at the stopping point of the flow. Three examples.

9539 Heat Transfer in Turbulent Pipe Flow. Raul R. Hunziker. *Franklin Institute, Journal*, v. 265, no. 3, Mar. 1958, p. 205-225.

Heat transfer to and from fully developed turbulent flow in a circular pipe and between parallel plates is analyzed.

9540* (German.) New Developmental Work on Volume-Converters. **Neuere Entwicklungsarbeiten an Mengenumwertern.** Wilhelm Guntermann and Josef Hecking. *GWF; Gas- und Wasserfach* (Gas), v. 99, no. 11, Mar. 14, 1958, p. 245-248.

Discusses new trends in the development of the so-called "volume-converter" which automatically converts to standard measurement units, the amounts of gas measured on an operating gas meter under variable pressures and temperatures.

9541 Heat Transfer to a Gas-Phase Chemical Reaction. William Schotte. *Industrial and Engineering Chemistry*, v. 50, Apr. 1958, p. 683-690.

Heat-transfer coefficients for flow with gas-phase, instantaneous reactions can be predicted by using calculated effective thermal conductivities and effective specific heats in conventional heat-transfer correlations.

9542 Heat Transfer in Laminar Pipe Flow With Uniform Coolant Injection. S. W. Yuan and A. B. Finkelstein. *Jet Propulsion*, v. 28, Mar. 1958, p. 178-181.

Studies the effect of coolant injection at the wall on the temperature distribution of the laminar flow of a fluid in a porous wall pipe.

9543* On the Propagation of the Hydromagnetic Waves in Compressible Ionized Fluid. Tosiya Taniuti. *Progress of Theoretical Physics*, v. 19, no. 1, Jan. 1958, p. 69-76.

A mathematical treatment of wave propagation due to the coupled motion of hydrodynamic flow and magnetic field is given based on the method of characteristics.

9544* On the Heat Transfer to Constant-Property Laminar Boundary Layer With Power-Function Free-Stream Velocity and Wall-Temperature Distributions. Isao Imai. *Quarterly of Applied Mathematics*, v. 16, no. 1, Apr. 1958, p. 33-45.

9545 Apparatus for Precision Flash Radiography of Shock and Detonation Waves in Gases. Herbert T. Knight and Douglas Venable. *Review of Scientific Instruments*, v. 29, Feb. 1958, p. 92-98.

9546* (Russian.) Experimental Investigation of the Turbulent Boundary Layer at High Subsonic Velocities. **Eksperimental'noe issledovanie turbulentnogo pogranichnogo sloia pri bol'shikh dozvukovykh skorostiakh.** M. E. Deich and A. E. Zariankin. *Teploenergetika*, v. 5, no. 3, Mar. 1958, p. 21-25.

Determination of the effect of Mach numbers (from 0.2 to 1.2) and Reynolds numbers from $0.5 \cdot 10^6$ to $5 \cdot 10^6$ on velocity profile of the turbulent boundary layer.

9547 Heat Transfer From Parallel Rods in Axial Flow. D. A. Dingee and J. W. Chastain. *U. S. Atomic Energy Commission, TID*-7529 (pt. 1, Bk. 2), Nov. 1957, p. 462-501. (UF767 Un3ti Contin.)

Local convective heat transfer coefficients are presented for heated rod clusters in axial water flow. Three ratios of center-to-center spacing to rod diameters 1.12, 1.20, and 1.27 in both a square and triangular lattice array were tested. The tests were run at two Prandtl numbers 1.18 and 1.75, over a range of Reynolds numbers between 104 and 106.

9548 The Interaction of a Reflected Shock Wave With the Boundary Layer in a Shock Tube. Herman Mark. *U. S. National Advisory Committee for Aeronautics, Technical Memorandum* 1418, Mar. 1958, 128 pp. (TL570 Un3tm Vis.)

9549 Prandtl-Meyer Expansion of Chemically Reacting Gases in Local Chemical and Thermodynamic Equilibrium. Steve P. Heims. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4230, Mar. 1958, 17 pp. (TL570 Un3t Vis.)

Calculation of Prandtl-Meyer flow. The property of air which governs the flow is a quantity depending only on the ratio of enthalpy to the square of the speed of sound; the analogous quantity for an inert gas depends only on the ratio of specific heats.

9550 The Feasibility of Using Wholly External Ultrasonics to Measure Fluid Flow Within Thick-Walled Metal Pipes. V. A. Del Grosso and E. M. Spurlock. *U. S. Office of Naval Research, NRL Report* 4967, Nov. 12, 1957, 40 pp. (T21 Un3.5n Contin.)

Formulation and evaluation of three pulsed ultrasonic systems to measure the flow of a pressurized liquid within a thick-walled pipe, with all equipment external to the pipe.

See also: **9611** (duct design for power plants); **9629** (simple fluid level sensing device); **9653** (gas measurements); **9655** (fluid friction of disc rotating in a liquid); **10012** (flow and sound attenuation in absorbing ducts); **10022** (boundary layer experiments in liquid He).

FOOD TECHNOLOGY

9551* Microwave vs. Conventional Cooking. I. Reduced and Total Ascorbic Acid in Vegetables. Carol L. Campbell, Tung Yu Lin, and Bernard E. Proctor. *American Dietetic Association, Journal*, v. 34, Apr. 1958, p. 365-370.

Study of fresh cabbage, fresh and frozen broccoli, and frozen green peas indicates that ascorbic acid retention in vegetables is greater with microwave cooking than with other methods of heating.

9552 Incidence and Nature of Enterococci on Plant Materials. J. Orvin Mundt, A. H. Johnson, and Rouben Khatchikian. *Food Research*, v. 23, no. 2, Mar.-Apr. 1958, p. 186-193.

In a comparative study, enterococci were isolated from 62% of samples of plants and soils taken from agricultural and inhabited areas, and from 22% of similar samples taken from unpopulated areas.

9553* Canning Quality of Elberta Peaches as Affected by Nitrogen Fertilization. G. H. Carter, D. W. Ingalsbe, A. M. Neubert, and E. L. Proebsting, Jr. *Food Technology*, v. 12, Apr. 1958, p. 174-179.

9554* Biological Availability of Lysine. J. D. Gupta, A. M. Dakroury, A. E. Harper, and C. A. Elvehjem. *Journal of Nutrition*, v. 64, no. 2, Feb. 1958, p. 259-270.

Values for the biological availability of the lysine in seven different purified proteins, and the proteins of three cereals and two milk powders, were determined by measuring their value as supplements to a wheat gluten diet low in lysine.

See also: **9126** (trace elements in animal nutrition).

FUELS AND COMBUSTION

9555* (Russian.) A Model for the Burning and Gasification of Solid Fuel. **O modelirovanii protsessov goreniia i gazifikatsii tverdogo topliva.** V. A. Smirnov. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Tekhnicheskikh Nauk*, 1958, no. 1, Jan., p. 95-99.

Sets up a model based on the assumption that burning and gasification processes proceed in the diffusion region.

9556* Gas Calorimetry. IV. Comparisons, Calculations, and Corrections. *American Gas Journal*, v. 185, Apr. 1958, p. 27-33.

Response time and other characteristics of claorimeters. Flow of gas sample and combustion air; quantity of gas burned. Heat exchange. Determination of heat losses and total heating value.

9557* Fuel Oil Cracking. M. A. Spagiari. *Coke and Gas*, v. 20, Mar. 1958, p. 124-127.

Tests for the chemical evaluation of oils for gasification in gasworks.

9558* The Ignition of Combustible Gases by Flames. H. G. Wolfhard and D. S. Burgess. *Combustion and Flame*, v. 2, no. 1, Mar. 1958, p. 3-12.

Ignition of a stoichiometric methane-nitric oxide mixture by stationary pilot flames was investigated.

9559* (Estonian.) Investigation of Furnace Aerodynamics on a Model. **Kolde aerodünaamika uurimine mudeli abil. II.** Processes of Mixture Formation in Combustion of Oil Shale on the Traveling Grate Stoker. **Koldegaaside segunemisprotsessid polevkivi kihispolemisel.** J. Ivanov, U. Saar, and Kh. H. Sui. *Eesti NSV Teaduste Akadeemia Toimetised. Tehniliste ja Füüsikalis-Matemaatiliste Teaduste Seeria*, 1957, no. 4, p. 313-320.

Quantitative influence of structural and regime parameters on the processes of mixture formation in the furnace.

9560* (Estonian.) Automatic Regulation of Oil Shale Burning on Mechanical Grates. **Peenpolevkivi mehaanilistel restidel poletamise automaatne reguleerimine.** E. Künnap. *Eesti NSV Teaduste Akadeemia Toimetised. Tehniliste ja Füüsikalis-Matemaatiliste Teaduste Seeria*, 1957, no. 4, p. 333-343.

The dynamic qualities of one direct and two indirect schemes of automatic regulation.

9561 The Effects of Coke Size on Cupola Performance. 28 pp. 1957. British Coke Research Assn., London. (TP336 B77.6e Over.)

Coke size caused changes in cupola performance between mean sizes of 2.4 and 3.7-in., but had no significant effect between 3.7 and 5-in. There was no significant change in the heat efficiency of cupola melting or in metal quality with change in coke size.

9562 Fluid-Bed Pretreatment of Bituminous Coals and Lignite. Direct Hydrogenation of Chars to Pipeline Gas. K. C. Channabasappa and H. R. Linden. *Industrial and Engineering Chemistry*, v. 50, Apr. 1958, p. 637-644.

Optimum pretreatment temperature was 600 F for bituminous coals and 500 F for lignite. Pipeline gas containing 70 to 80 mole % of methane plus ethane were obtained at 1350 F.

9563* The Dewatering of Fine Coal. V. R. Gray. *Institute of Fuel, Journal*, v. 31, no. 206, Mar. 1958, p. 96-108.

New laboratory technique for investigating dewatering consists of applying increments of suction to the saturated coal bed and measuring the water removed at equilibrium for each increment, whence pore size distribution for the coal can be obtained.

9564 (French.) Study of the Properties of Six Cokes. **Étude des propriétés de six cokes.** *Institut de Recherches de la Sidérurgie, Publications*, ser. B, no. 35, Dec. 1957, 116 pp. (TN602 In7p Vis.)

A systematic study of the classical and more recent measuring techniques applicable to cokes typical of the East, North, Saar, and Ruhr basins.

9565 A Recording Sodium-Line Reversal Pyrometer. W. M. Brobeck, R. E. Clemensen, and W. E. Voreck. *Jet Propulsion*, v. 28, Apr. 1958, p. 249-252.

Instrument for the measurement of flame temperatures from 1500 to 2700 C by the sodium-line reversal method.

9566* (Russian.) Coke Formation and Prediction of Coke Quality. **Protsess obrazovaniia i prognoz kachestva koksa.** E. M. Taits. *Koks i Khimiia*, 1958, no. 3, p. 19-25.

Causes of coke cracking. Strength of lump coke, Coal charges for coking.

9567* (Russian.) Theoretical and Experimental Basis for Application of Isotopes in Investigation of the Thermal Decomposition Process and Coking of Coal. **Teoreticheskie i eksperimental'nye osnovy primeneniia radioizotopov k issledovaniiu protsessa termicheskogo razlozheniia i spekaniia kamennykh uglei.** K. P. Medvedev and V. M. Petropol'skaia. *Koks i Khimiia*, 1958, no. 3, p. 25-29.

9568 Temperature Determination in Flames by X-Ray Absorption Using a Radioactive Source. George J. Mullaney. *Review of Scientific Instruments*, v. 29, Feb. 1958, p. 87-91.

9569* (French.) A Contribution to the Study of the Composition of Blast Furnace Gas. Application to the Evaluation of Coke Consumption. **Contribution a l'étude de la composition du gaz de haut fourneau. Application au calcul des mises au mille de coke.** A. Decker and L. Bousmanne. *Revue Universelle des Mines*, v. 14, ser. 9, no. 3, Mar. 1958, p. 80-105.

Relationships between the gas of the blast furnace top and the consumption of useful C. Importance of the variation of the rate of direct reduction. Effects of temperature and moisture in the blast.

9570* The Microscopical Examination of Coal and Coke, Including Some Physical Tests Relating to Coking Properties. B. Moodie. *South African Institute of Mining and Metallurgy, Journal*, v. 58, no. 6, Jan. 1958, p. 271-290.

9571 Symposium on "Flames and Industry". 46 pp. 1957. British Flame Research Committee of the International Flame Radiation Research Foundation, London. (TP315 In7s)

Eight papers on: characteristics of turbulent jet diffusion flames; flame research techniques in industry; heat transfer-from flames in the steel, glass, and cement industries and from boiler flames; flame radiation in gas turbine combustion chambers; radiant heat exchange in a gas-filled enclosure.

9572 Stability of Propane-Air Flames in Vortex Flow. A. E. Potter, Jr., E. L. Wong, and A. L. Berlad. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4210, Feb. 1958, 27 pp. (TL570 Un3t Vis.)

Blowoff velocity was proportional to the 0.73 power of vortex strength, and increased slightly with fuel concentration. The flames were stabilized by a stagnation or near-stagnation region induced by a pressure defect existing at the vortex center.

See also: **9176** (generating gas production); **9215** (coal sampling); **9226** (determination of volatile fractions in fuel); **9273** (infra-red spectroscopy from brown coals); **9323** (high pressure carbon-steam reaction); **9331** (heats of combustion of nitroalkanes and nitric esters); **9357** (flame studies on ethylene glycol dinitrate); **9371** (oil cracking); **9577** (underground gasification of shale); **9609** (combustion of liquid fuel spray); **9610** (chemical reactions in jet flames); **9643** (venturi pneumatic pyrometer); **9711** (compressed air in the open-hearth furnace flame).

GEOLOGY, GEOPHYSICS, MINERALOGY, AND MINING ENGINEERING

9573 Piezobirefringence in Silicon. A. A. Giardini. *American Mineralogist*, v. 43, nos. 3/4, Mar.-Apr. 1958, p. 249-262.

A stress-birefringence investigation was carried out on high purity Si at a wavelength of 1.11 μ. Linearity of the stress-optical relationship was established up to stresses of approximately 450 kg./cm^2.

9574 Annual Report of the Director of the Geophysical Laboratory. 1956-1957. 252 pp. Carnegie Institution of Washington, Geophysical Laboratory, Washington, D. C. (Pamphlet.)

Papers tell of recent activity in phase-equilibrium relations of the major mineral groups, research on ore minerals, radioactive age measurements, paleobiochemistry, chemical reactions at extremely high pressures, crystallography, and investigations of order-disorder phenomena.

9575 (English.) **A Note on Design Considerations for a Proposed Auroral Radar.** Nelson Wax. *Chalmers Tekniska Högskolas Handlingar*, no. 182, 1957, 16 pp. (T4 C35t Contin.)

9576 Hugo Müller Lecture: The Early History of the Solar System as Indicated by the Meteorites. Harold C. Urey. *Chemical Society, Proceedings*, 1958, Mar., p. 67-78.

9577* (Russian.) Some Problems of the Semi-Infinite Seam Theory in the Underground Gasification of Shale by Means of the Combined Method. **Nekotorye voprosy teorii polubeskonechnogo plasta pri podzemnoi gazifikatsii slantsa po kombinirovannomu metodu.** M. Ia. Gubergrits. *Eesti NSV Teaduste Akadeemia Toimetised. Tehniliste ja Füüsikalis-Matemaatiliste Teaduste Seeria*, 1957, no. 4, p. 301-312.

Some theoretical and experimental questions of the hydrodynamics of the "combined" method. Applicability of the semi-infinite seam theory is studied in order to give a mathematical description of an underground chamber.

9578* (German.) Encyclopedia of Physics. **Handbuch der Physik. v. L. Pt. I.** Astrophysics. Stellar Surfaces-Binaries. **Astrophysik. Sternoberflächen-Doppelsterne.** S. Flugge, editor. 458 pp. 1958. Springer-Verlag, Berlin. (QC21 G27h3 Ref.)

Spectral classification of normal stars. Stars with peculiar spectra. Molecular bands in astral spectra. Theory and spectra of planetary nebula. Spectra of the white dwarfs. Visual binaries. Spectroscopic binaries. General theory of stellar atmosphere.

9579* The Isotopic Composition of the Nitrogen in Natural Gases and Associated Crude Oils. T. C. Hoering and H. E. Moore. *Geochimica et Cosmochimica Acta*, v. 13, no. 4, 1958, p. 225-232.

Measurement of the $^{15}N/^{14}N$ ratio from a number of samples of natural gas and crude oil show that wide variations exist. Experiments on the flow of N through porous sandstone indicate that two processes could account for the fractionation of the N isotopes in natural gas, namely effusive flow and surface diffusion.

9580* Determinations of Thorium and Uranium in Sedimentary Rocks by Two Independent Methods. John A. S. Adams, Jasper E. Richardson, and Charles C. Templeton. *Geochimica et Cosmochimica Acta*, v. 13, no. 4, 1958, p. 270-279.

One method is based upon γ-ray spectral analysis; the other on total α-activity and fluorometric U determinations.

9581 Pennsylvanian Underclays—Potential Bonding Clays for Use in Foundries. Haydn H. Murray. *Indiana Department of Conservation, Geological Survey, Report of Progress No.* 11, Nov. 1957, 27 pp. (QE109 In2.3r Contin.)

Five underclays from western and southwestern Indiana are potential sources of foundry bonding clay. Samples with high clay content and a moderate percentage of montmorillonite produced the best green and dry strengths.

9582* Turbulence in the Ionosphere With Applications to Meteor Trails, Radio Star Scintillation, Auroral Radar Echoes, and Other Phenomena. H. G. Booker. Paper from Proceedings of the Polar Atmosphere Symposium. Pt. II. Ionospheric Section. Oslo, 2-8 July, 1956. *Journal of Atmospheric and Terrestrial Physics* (Supplement), 1957, p. 52-81.

Irregularities in electron density responsible for incoherent scattering of radio waves in the ionosphere are discussed on the assumption of isotropic turbulence in the neutral molecules.

9583* Forecasting of Disturbed HF Communication Conditions. R. C. Moore. Paper from Proceedings of the Polar Atmosphere Symposium. Pt. II. Ionospheric Section. Oslo, 2-8 July, 1956. *Journal of Atmospheric and Terrestrial Physics* (Supplement), 1957, p. 147-156 + 2 plates.

Predictions are based upon the 27-day recurrence tendency in solar-terrestrial effects, ionospheric responses to specific types of solar activity, normal persistence tendency of ionospheric conditions, and detailed knowledge of current geomagnetic, ionospheric, and radio transmission conditions.

9584* An Extension to the Mode Theory of VLF Ionospheric Propagation. James R. Wait. *Journal of Geophysical Research*, v. 63, no. 1, Mar. 1958, p. 125-135.

The wave-guide mode theory of VLF propagation for a sharply-bounded homogeneous ionosphere is refined to include stratification at the lower edge of the ionosphere.

9585 Charting Physical Properties of the Atmosphere. *Missiles and Rockets*, v. 3, no. 4, Apr. 1958, p. 139-142.

An atmosphere chart presents accurate values of temperature, pressure, and specific weight of the air for altitudes up to 100,000 ft. A high altitude chart shows properties of the earth's atmosphere up to 2 million ft.

9586 How to Get the Most Hole for Your Money. I. John W. Speer. *Oil and Gas Journal*, 56, no. 13, Mar. 31, 1958, p. 90-96.

Method for determining optimum drilling techniques.

9587 The Threshold of Space. The Proceedings of the Conference on Chemical Aeronomy. M. Zelikoff, editor. 342 pp. 1957. Pergamon Press, New York. (QC807.5 Un3.1t)

Papers deal with atmospheric photochemistry of Earth and Venus, spectroscopy and photochemistry, rocket probing of the upper atmosphere, and phenomena produced by hypersonic flight.

9588 Radar-Synoptic Analysis of an Intense Winter Storm. Edwin Kessler, III. *U. S. Air Force, Cambridge Research Center, Geophysical Research Papers No.* 56, Oct. 1957, 218 pp. (QC806 Un3.2g Vis.)

A theory is developed relating radar weather echoes to dynamics of steady and horizontally uniform precipitation which is related to quantitative 3-dimensional radar weather maps from a severe New England storm.

9589 Final Report. Uranium Recovery, Uranium Geochemistry, Thermoluminescence and Related Studies. Farrington Daniels. *U. S. Atomic Energy Commission, AECU*-3599, Nov. 1957, 57 pp. (UF767 U3au Contin.)

Process for recovery of U at the mine with portable equipment; distribution and geochemistry of U; thermoluminescence of LiF, the alkali halides, Al oxides, sulfates, and many inorganic salts and minerals; radiation damage in LiF and metamict minerals.

9590 Spodumene—Major Source of Lithium. James S. Browning. *U. S. Bureau of Mines Information Circular* 7824, Feb. 1958, 20 pp. (TN21 Un3i Vis.)

Occurrence, mineralogy, reserves, mining, concentration, extraction, production, consumption, and uses in the U.S. and Canada.

9591 Analyses of Crude Oils From 470 Important Oilfields in the United States. C. M. McKinney and E. L. Garton. *U. S. Bureau of Mines Report of Investigations* 5376, Dec. 1957, 276 pp. (TN21 Un3r Vis.)

9592 A Comparative Study of Statistical Analysis and Other Methods of Computing Ore Reserves, Utilizing Analytical Data From Maggie Canyon Manganese Deposit, Artillery Mountains Region, Mohave County, Ariz. Scott W. Hazen, Jr. *U. S. Bureau of Mines Report of Investigations* 5375, Feb. 1958, 188 pp. (TN21 Un3r Vis.)

9593* (Russian.) Method of Studying the Ionosphere by Means of an Artificial Earth Satellite. **O metode issledovaniia ionosfery s pomoshch'iu iskusstvennogo sputnika zemli.** Ia. L. Al'pert. *Uspekhi Fizicheskikh Nauk*, v. 64, no. 1, Jan. 1958, p. 3-14.

Principle of the measurement schemes. Analyses of results. Evaluation of measured magnitudes and their accuracy.

9594 Vistas in Astronomy. Arthur Beer, editor. v. II. 1001 pp. 1956. Pergamon Press, New York. (QB43 B39v)

A compilation of papers on solar-terrestrial relations, geophysics, the planetary system, stellar astronomy, photometry, spectroscopy, spectral peculiarities and novae, galaxies, cosmogony, and cosmology.

9595 White Dwarfs. E. Schatzman. 180 pp. 1958. Interscience Publishers, New York. (QB883 Sch35w)

Observation and discovery of white dwarf stars; characteristics; spectra; physical properties of dense matter; internal constitution of white dwarfs; nuclear reactions at high densities; energy generation; speculations about origin and evolution.

9596 Worldwide Occurrence of Sporadic E. Ernest K. Smith, Jr. 278 pp. 1957. Available from Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (TK6553 Sm55w)

Study attempts to describe sporadic *E* on a worldwide basis utilizing observations at H.F. with vertical-incidence ionosphere-sounding equipment (ionosondes) and at V.H.F. of transmissions over oblique-incidence paths.

See also: **9045** (star sensors for automation navigation); **9197** (determination of He in Zircon); **9575** (design of auroral radar); **9922** (CO_2 counting for radiocarbon measurements).

GRAPHIC ARTS

9597* Versamids. *American Ink Maker*, v. 36, Mar. 1958, p. 33 + 1 page.

Polyamide resin products, of vegetable origin, are particularly recommended for flexographic and rotogravure inks. Adhesion is outstanding.

9598 An Investigation Into the Use of Duplicator Presses and Membrane Plates for Newspaper Production. D. L. Goffredo. *ANPA Research Institute, Technical Report No.* 26, Feb. 15, 1958, 5 pp. (Z119 Am35t Contin.)

9599 Developing a $228-Million Film Market. *Chemical Week*, v. 82, Apr. 19, 1958, p. 63 + 3 pages.

A summary of various companys' current color film research, with some details of Polaroid process for color photographs in three minutes.

9600 New Trends in Making Prints From Microfilm. William R. Hawken. *Industrial Photography*, v. 7, Apr. 1958, p. 36 + 2 pages.

New printing processes have made the use of microfilm as an intermediate for duplicating documents exceedingly attractive.

9601* Purification and Chemical Sensitization of Photographic Gelatin. Walter D. Kelly, Jr. *Journal of Photographic Science*, v. 6, no. 1, Jan.-Feb. 1958, p. 16-22.

Photographic evaluation of methods of producing inert gelatins indicated that treatment with peroxyacetic acid was most effective. A gelatin treated in this way was partially restored to its original photographic characteristics by the addition of both Na_2SO_3 and $Na_2S_2O_3$.

9602* Logetronics. Robert L. Yinger. *Modern Lithography*, v. 26, Apr. 1958, p. 52 + 3 pages.

Method for producing quality photographic prints is applied in litho. Automatic exposure and dodging is by a scanning light pattern on the face of a cathode ray tube which is projected through a lens to the negative and paper held in close contact.

9603* Aligning the Blanket. Charles F. Geese. *National Lithographer*, v. 65, Apr. 1958, p. 32 + 1 page.

Some ways to insure proper tightening the proper tension for printing quality.

9604* Controlled Stereo Metal Melting at the Touch of a Button. E. L. Read and C. E. Price. *Printing Equipment Engineer*, v. 88, no. 7, Apr. 1958, p. 33-36.

Details of completely automatic melting system.

9605* Offset Plate Graining. II. Adam Henri Reiser. *Printing Equipment Engineer*, v. 88, no. 7, Apr. 1958, p. 48-49.

Graining new metal; size of graining balls; handling of plates.

9606* A Silver-Recovery Apparatus for Operation at High Current Densities. Nicholas J. Cedrone. *Society of Motion Picture and Television Engineers, Journal*, v. 67, Mar. 1958, p. 172-174.

Agitation is provided by an external pump. With the solution nozzles located tangential to a cylindrical cathode, high surface velocity is attained and mass flow held to reasonable values.

See also: **9661** (piston carbon lacquer shown by photography); **9925** (high-speed photography of pulsed gas discharges).

HEAT POWER

9607* (Russian.) Aspects of Utilizing Atomic Energy in Closed Circuit Power Plants (Gas Turbine). **Perspektivy ispol' zovaniia atomnoi energii v gazoturbinnykh silovykh ustanovkakh zamknutogo tsikla.** A. I. Mikhailov. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Tekhnicheskikh Nauk*, 1958, no. 1, Jan., p. 113-119.

Analysis of a two-circuit atomic gas-turbine power plant with Na cooling of the reactor utilizing He, N, and Co_2 as working medium. Scheme of the plant with heat regeneration and intermediate cooling of the gas.

9608 Dynamic Response of Heat Exchangers Having Internal Heat Sources. I-II. J. A. Clark, V. S. Arpaci, and K. M. Treadwell. *ASME, Transactions*, v. 80, no. 3, Apr. 1958, p. 612-634.

An analytical evaluation of the dynamic response of the coolant temperature and of the heat-transfer-surface and fluid-surface temperature difference, as functions of time and space.

9609* On the Theory of Combustion Rate of Liquid Fuel Spray. Yasusi Tanasawa and Tuneo Tesima. *Bulletin of JSME*, v. 1, no. 1, Jan. 1958, p. 36-41.

The change in combustion with time is only slightly affected by the size distribution of sprayed drops, but is strongly affected by the volume-surface mean diameter.

9610 Chemistry Problems in Jet Propulsion. S. S. Penner. 394 pp. 1957. Pergamon Press, New York. (TL709 P38c)

Atomic and molecular structure; combustion thermodynamics; chemical reactions in flow systems.

9611 A Visual Qualitative Approach to Duct Design for Power Plants. M. J. Archbold. *Combustion*, v. 29, no. 10, Apr. 1958, p. 34-40.

Apparatus was adapted to visual study of the flow of gas through power plant ducts, fans, air heaters, and dust collectors.

9612* Symposium on Exhaust Valve Life. *Institution of Mechanical Engineers, Automobile Division, Proceedings*, 1955-1956, no. 5, p. 113-170 + 10 plates.

Five papers reporting studies on exhaust valve life, including semi-metallurgical and mechanical considerations and performance of vehicle engines on heavily loaded fuels.

9613 Some Effects of Oxidizer Concentration and Particle Size on Resonance Burning of Composite Solid Propellants. Leon Green, Jr. *Jet Propulsion*, v. 28, Mar. 1958, p. 159-164.

Rate of energy release (the product of burning rate, propellant density, and heat of explosion) affords a better measure of the relative stability behavior of various formulations than does either burning rate or energy content alone.

9614* (Russian.) Profiling Radial-Axis Turbine Blades by the Characteristic Method. **Profilirovanie lopastei rabochego kolesa radial'no-osevoi turbiny metodom osobennostei.** K. A. Kiselev. *Leningrad. Universitet. Vestnik*, v. 13, no. 1, 1958, p. 108-128.

Improved method of design and calculation for determination of cavitation properties of the rotor wheel.

9615 PWR. The Significance of Shippingport. *Nucleonics*, v. 16, Apr. 1958, p. 53-72.

The design, engineering, costs, operation, and importance of world's first large-scale nuclear power plant.

9616 Proceedings of the American Power Conference. v. XIX. 746 pp. 1957. Illinois Institute of Technology, Chicago. (TJ5 M58p Vis.)

Papers deal with a wide range of subjects related to the generation, transmission, and utilization of power.

9617* (Italian.) The Boranes in Aeronautic Propulsion. I **borani nella propulsione aerea.** Ernesto Macioce. *Rivista Aeronautica*, v. 34, no. 4, Apr. 1958, p. 563-575.

Commercial preparation of boranes. Physico-chemical and thermo-chemical properties. Combustion problems. Jet motor performance; flight characteristics.

9618 Cloud-Droplet Investigation in Engine Inlets With Inlet Velocity Ratios of 1.0 and 0.7. Rinaldo J. Brun. *U. S. National Advisory Committee for Aeronautics, Report* 1317, 1957, 35 pp. (TL521 Un3r Vis.)

The paths of cloud droplets into two engine inlets were calculated for a wide range of meteorological and flight conditions. The amount of water in droplet form ingested by the inlets, and the amount and distribution of water impinging on the inlet walls are so obtained.

9619 Relation of Turbojet and Ramjet Combustion Efficiency to Second-Order Reaction Kinetics and Fundamental Flame Speed. J. Howard Childs, Thaine W. Reynolds, and Charles C. Graves. *U. S. National Advisory Committee for Aeronautics, Report* 1334, 1957, 13 pp. (TL521 Un3r Vis.)

9620 Propellant Vaporization as a Criterion for Rocket Engine Design; Relation Between Percentage of Propellant Vaporized and Engine Performance. Marcus F. Heidmann and Richard J. Priem. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4219, Mar. 1958, 19 pp. (TL570 Un3t Vis.)

9621 Drop-Size Distributions for Impinging-Jet Breakup in Airstreams Simulating the Velocity Conditions in Rocket Combustors. Robert D. Ingebo. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4222, Mar. 1958, 23 pp. (TL570 Un3t Vis.)

See also: **9171** (drives for gas compressors); **9571** (flames and industry symposium); **9698** (corrosion by V_4O_5). **10193** (aircraft engine cooling system).

INFORMATION—PREPARATION AND DISSEMINATION

9622 Availability of Information From Federal Departments and Agencies. XV. Restrictions on Flow of Scientific and Technological Information. 130 pp. 1958. United States Government Printing Office, Washington, D. C. (JK849 Un3.2a)

Hearings before a subcommittee to the Committee on Government Operations, House of Representatives, Eighty-Fifth Congress, second session.

9623* The Automatic Creation of Literature Abstracts. H. P. Luhn. *IBM Journal of Research and Development*, v. 2, no. 2, Apr. 1958, p. 159-165.

Technical articles in machine-readable form are scanned by a data-processing machine and analyzed in accordance with a standard program. Statistical information derived from word frequency and distribution is used by the machine to compute a relative measure of significance, first for individual words and then for sentences. Sentences scoring highest in significance are extracted and printed out to become the "auto-abstract".

9624 Selection of a Microrecording Program. Chester M. Lewis and William H. Offenhauser, Jr. *Industrial Photography*, v. 7, Apr. 1958, p. 31 + 4 pages.

The major forms of microtext are described, with their uses, costs, and advantages.

9625 Bibliography of Sampled-Data Control Systems and Z-Transform Applications. H. Freeman and O. Lowenschuss. *IRE Transactions on Automatic Control*, PGAC-4, Mar. 1958, p. 28-30. (TK1 In6.6ac Vis.)

9626 AES Research Project No. 18. Mechanical Finishing of Metal Surfaces, Bibliography. *Plating*, v. 45, Apr. 1958, p. 380-384.

9627 The Translating Machine: An ABC for You. Douglas C. Greenwood. *Product Engineering*, v. 29, no. 12, Mar. 24, 1958, p. 30-33.

A simple survey of the problems involving language translation and how they are being solved.

See also: **9600** (making prints from microfilm).

INSTRUMENTATION

9628 (Russian.) Electron Microscopic Study of Objects in a Gaseous Medium. **Elektronnomikroskopicheskoe issledovanie ob'ektov v gazovoi srede.** I. G. Stoianova. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 2, Jan. 11, 1958, p. 325-327 + 1 plate.

Resolving power is above 120 Å at pressures close to atmospheric. Development of a micro-camera in which the gas pressure can be varied from 0 to 700 mm. Hg, without disturbing the operation and without interruption of the observation process.

9629* A Fluid Level Sensing Device of Simple Design. Reinhold Gerharz. *American Geophysical Union, Transactions*, v. 39, no. 1, Feb. 1958, p. 121-122.

A liquid-filled section of a coaxial conductor is used as a level sensing element.

9630 Differential Thermal Analysis Apparatus for Heating and Cooling Data. D. D. Williams, R. D. Barefoot, and R. R. Miller. *Analytical Chemistry*, v. 30, pt. 1, Apr. 1958, p. 492-494.

Versatile apparatus, based on concept of Rosenhain, uses a vertical heavy-walled metal tube to establish a constant reproducible temperature gradient. Sample holder, containing the thermocouples, is pulled in either direction through this tube at rate required to produce desired rates of temperature change.

9631* (English.) **A Fast Photolysis Flash Lamp for Very High Light Intensities.** Stig Claesson and Lars Lindqvist. *Arkiv för Kemi*, v. 12, no. 1, 1958, p. 1-8.

Short flash duration times (5-25 μsec.) were achieved by reducing the inductance of the discharge circuit to a minimum. The discharge takes place in an annular space outside the transparent quartz lamp tube. The substance to be illuminated is placed inside this tube.

9632* Modern Trends in Electric Furnace Practice. D. J. Williams. *Australasian Engineer*, 1957, Dec. 7, p. 60-67.

Types of electric furnaces and customary industrial applications of each type. Controlled atmospheres.

9633* Freeze-Drying Equipment for Large-Scale Laboratory Use. B. R. Record and R. Taylor. *Biochemical Journal*, v. 68, no. 3, Mar. 1958, p. 420-430.

The three types of machines described operate on the vacuum spin-freeze principle, in which an aqueous solution is caused to freeze rapidly by its evaporation in the vacuum chamber in which it is subsequently dried, any foaming or frothing of the material during freezing being suppressed by centrifugal force.

9634 A Crystal Controlled R.F. Induction Heater. E. Cohen. *Electronic Engineering*, v. 30, Apr. 1958, p. 177-181.

Construction, operation, and performance of a 2 kw. crystal-controlled heater designed for the growth of single crystals of CaO by the vapor phase transport method.

9635 A Transistor Operated Self-Balancing Radiation Pyrometer. D. W. Birnsting. *Electronic Engineering*, v. 30 Apri. 1958, p. 189-191.

Instrument is capable of measuring surface temperatures down to 150 C from a distance, using transistor circuits and a PbS cell.

9636 A Fluidless Direct-Drive Moving Bomb Calorimeter. W. A. Keith and H. Mackle. *Faraday Society, Transactions*, v. 54, pt. 3, Mar. 1958, p. 353-366 + 1 plate.

The Cu bomb has a mass of 10 kg. and its temperature rise is measured by the resistance change of a fine Cu wire element wound in circular grooves cut into the external surface. Heats of combustion of thianthrene and succinic acid were measured.

9637 Cascade Impactor for Adiabatic Measurements. J. A. Brink, Jr. *Industrial and Engineering Chemistry*, v. 50, Apr. 1958, p. 645-648.

Development of a small "in-line" cascade impactor and accessory equipment for adiabatic particle-size determinations.

9638 Strain-Gage Principles. M. A. LeGette. *Instruments and Automation*, v. 31, Mar. 1958, p. 447-449.

This introduction to resistance strain-gage work includes basic definitions, types of strain, member considerations, environmental factors, power supplies, bridge-balance techniques, and calibration methods.

9639 High-Temperature Strain Gages. Louis Herczeg and Paul Beckman. *Instruments and Automation*, v. 31, Mar. 1958, p. 460-461.

9640* A Strain-Gage Transducer for Bourdon Tubes. Loren E. Bollinger. *ISA Journal*, v. 5, Apr. 1958, p. 37-39.

Any Bourdon-tube type instrument can be converted into an electrical transducer with proportional signals acceptable to a standard self-balancing recorder.

9641* More Accurate Thermocouples With Percussion Welding. Joseph L. LeMay. *ISA Journal*, v. 5, Mar. 1958, p. 42-45.

New welding technique produces thermocouples with more perfect junctions. Characteristics of such couples are more uniform, reproducible, and accurate.

9642* Three Dimensional Microscopy. S. Tolansky. *Journal of Electronics and Control*, v. 4, no. 1, Jan. 1958, p. 63-95.

Three methods for the three-dimensional study of the microstructures of surfaces: multiple-beam interferometry, the light-profile microscope, and optical shadow casting.

9643 The Venturi Pneumatic Pyrometer. A. M. Godridge, R. Jackson, and G. G. Thurlow. *Journal of Scientific Instruments*, v. 35, no. 3, Mar. 1958, p. 81-88.

Design and use of instrument for measuring gas and flame temperatures.

9644 Thermostatic Controls. Raymond T. Haviland. *Machine Design*, v. 30, Apr. 3, 1958, p. 134-139.

Design, selection, and application characteristics of the three most widely used types of thermally operated switching devices.

9645* The Design of Platinum-Wound Electric Resistance Furnaces. J. E. Priddis. *Platinum Metals Review*, v. 2, no. 2, Apr. 1958, p. 38-44.

9646 The Accurate Measurement of Temperature. J. A. Hall. *Research*, v. 11, Apr. 1958, p. 147-151.

The Pt resistance thermometer, Hg thermometer, thermocouple, and disappearing-filament pyrometer are discussed.

9647 Calorimetric Assembly for the Measurement of Heats of Fusion of Inorganic Compounds. J. Goodkin, C. Solomons, and G. J. Janz. *Review of Scientific Instruments*, v. 29, Feb. 1958, p. 105-108.

Apparatus consists of a simple calorimeter, above which is a movable, vertical furnace for heating the specimen contained in a hermetically sealed Pt capsule.

9648 Small Barium Titanate Transducer for Aerodynamic or Acoustic Pressure Measurements. W. W. Willmarth. *Review of Scientific Instruments*, v. 29, Mar. 1958, p. 218-222.

Design, development, and calibration of transducer with sensitivity of 0.88 X 10^{-8} v/dyne/cm^2.

9649 Interferome Used to Study Transient Heating of Water. E. A. McLean, V. E. Scherrer, C. A. Nanney, and C. E. Faneuff. *Review of Scientific Instruments*, v. 29, Mar. 1958, p. 225-228.

A Mach-Zehnder interferometer was used to study transient conduction and convection about pulse-heated foils in water.

9650 Nonmagnetic, Vibrationless, Constant-Delivery Pump for Biological Solutions. Arthur S. Brill, Hendrick den Hartog, and Victor Legallais. *Review of Scientific Instruments*, v. 29, Mar. 1958, p. 242-243.

Pump utilizes the Bellofram, a hat-shaped rubber diaphragm, as a seal between a piston and cylinder of Plexiglas.

9651 A Glass-Metal Vacuum System. George L. Fox and Ernest Paige. *U. S. Atomic Energy Commission*, MLM-1015, Oct. 25, 1954 (issued Mar. 18, 1958), 9 pp. (UF767 Un3.1mL Contin.)

Principles for the design of equipment to perform complex operations where the use of controlled atmospheres, high vacuum, or both are required; practical apparatus designed on these principles.

9652 Portable Mercury Vapor Detector. C. S. McMurray and J. W. Redmond. *U. S. Atomic Energy Commission*, Y-1188, Jan. 1958, 45 pp. (UF767 Un3.1y Contin.)

Detector is a portable, self-contained, survey instrument, with a minimum range from 0 to 0.2 mg. Hg per cu. m. of air.

9653 Proceedings of the Sixteenth Annual Appalachian Gas Measurement Short Course 1956. R. E. Hanna, Jr., editor. *West Virginia University, Technical Bulletin No.* 46, May 1957, 817 pp. (TA21 W52t Contin.)

New developments in installing, using, and maintaining equipment used to measure gas quantities and measure and control pressures.

See also: **9445** (high-temperature electric furnace); **9748** (instruments for melting non-ferrous metals); **9939** (neutron detectors).

LUBRICATION AND FRICTION

9654 Transfer of Tungsten Carbide to Soft Metals During Single-Tranverse and Reciprocating Sliding. J. Golden and G. W. Rowe. *British Journal of Applied Physics*, v. 9, Mar. 1958, p. 120-121.

Describes experiments in which a small radioactive tungsten carbide hemisphere was slid slowly over copper and steel plates. The tungsten carbide transferred to the plates was assessed by counting and autoradiography.

9655* On Fluid Friction of Rotational Rough Disc in a Rough Vessel. Kōmei Watabe. *Bulletin of JSME*, v. 1, no. 1, Jan. 1958, p. 69-74.

Relative roughness of the disc surface was varied by changing the size of the sand-grain and increasing or decreasing the axial and radial clearances.

9656 (English.) **The Infinite Journal Bearing, Considering Vaporization.** Leif Floberg. *Chalmers Tekniska Högskolas Handlingar*, no. 189, 1957, 82 pp. (T4 C35t Contin.)

Deals with the 360° infinite journal bearing, both theoretically and experimentally. The behavior of vaporized regions is specially studied. It is shown that it is possible to have a bearing operating with positive pressure all around the circumference. This means no vapor region in the bearing and horizontal attitude-eccentricity curve.

9657 (English.) **The Finite Journal Bearing, Considering Vaporization.** Bengt Jakobsson and Leif Floberg. *Chalmers Tekniska Högskolas Handlingar*, no. 190, 1957, 117 pp. (T4 C35t Contin.)

Analyzes journal bearings of finite width with consideration to all boundary conditions and negative pressure vapor zones. A theory for vaporization is put forward where the conditions are strictly treated all around the periphery. The boundary conditions for the beginning and the end of a vapor region are derived. Describes how to determine the power loss for a vapor region.

9658* (English.) **Vibration of Pivot Type Ball Bearings.** Tatsuo Utsumi, Renzo Kaneko, and Junzo Okamoto. *Journal of Mechanical Laboratory of Japan*, v. 3, no. 2, 1957, p. 61-69.

Noise and vibration of a miniature pivot-type ball bearing at high speed were measured. The magnitude of vibration is proportional to the accuracy of bearing elements.

9659 New Lubricants and Hydraulic Fluids for High Temperatures. E. D. Brown, Jr. *Materials in Design Engineering*, v. 47, Apr. 1958, p. 124-126.

Three new silicone fluids can be used as hydraulic fluids and lubricants over the range of −65 to 700 F.

9660* Development of an Extreme High Temperature Grease. I. W. Armstrong and H. A. Woods. *NLGI Spokesman*, v. 22, no. 1, Apr. 1958, p. 9-13.

Experimental data on a methyl phenyl silicone fluid thickened with Indanthrene Blue RS indicate good performance up to 650 F.

9661* Lubricant Tests by Photography. *Oil Engine and Gas Turbine*, v. 25, Mar. 1958, p. 410-411.

Special sensitized paper enables a reflex print to be made of a piston showing the carbon and lacquer deposits in a panoramic view.

9662 (Russian.) Replacing Brass Retainers of Roller Bearings by Retainers Stamped From Steel. **Zamena latunnykh separatorov u rolikovykh podshipnikov stal'nymi shtampovannymi.** I. V. Kalashnikova. *Promyshlennaia Energetika*, v. 13, no. 2, Feb. 1958, p. 21-22.

Design, manufacture, and economic advantages of steel retainers.

9663* The Finite Length Partial Fitted Journal Bearing With Axial Oil Groove. Melvin J. Jacobson. *Quarterly of Applied Mathematics*, v. 16, no. 1, Apr. 1958, p. 1-10.

Mathematical analysis of the pressure distribution in the lubricating film when the lubricant is introduced under constant pressure through an axial bearing groove.

9664* (Russian.) Research in the Field of Roller Bearings. **Issledovaniia v oblasti podshipnikov kacheniia.** N. A. Spitsyn. *Vestnik Mashinostroeniia*, v. 38, no. 3, Mar. 1958, p. 3-8.

A brief survey of research aimed at setting up theoretical principles for the design and construction of ball and roller bearings of greater supporting capacity, precision, speed, and durability.

9665* (Russian.) The Strength and Wear-Resistance of Roller-Bearing Parts. **O prochnosti i iznosostoikosti detalei podshipnikov kacheniia.** S. V. Pinegin. *Vestnik Mashinostroeniia*, v. 38, no. 3, Mar. 1958, p. 8-11.

Effect of heat treatment and operating temperatures on fatigue, wear, and seizing properties.

9666* (Russian.) The Distribution of Static Pressures on Roller Bearings. **Raspedelenie staticheskikh davlenii na roliki podshipnikov.** N. V. Rodzevich and V. I. Rul'kov. *Vestnik Mashinostroeniia*, v. 38, no. 3, Mar. 1958, p. 12-13.

Pressures are determined with the aid of a roller-dynamometer made from the roller of the bearing tested.

9667* (Russian.) Reducing Friction in Rubber Bearings at Starting. **Snizhenie treniia v rezinopodshipnikakh pri puske.** A. V. Kol'chenko and A. A. Silin. *Vestnik Mashinostroeniia*, v. 38, no. 3, Mar. 1958, p. 27-29.

Shows the relationship between the starting point of the supporting bearing on one hand, and the purity of metal surface and the specific pressure exerted upon the bearing, on the other hand.

9668* The Mechanism of Boundary Lubrication and the Properties of the Lubricating Film. Short- and Long-Range Action in the Theory of Boundary Lubrication. B. V. Deryaguin, V. V. Karassev, N. N. Zakhavaeva, and V. P. Lazarev. *Wear*, v. 1, no. 4, Feb. 1958, p. 277-290.

Two versions of the blow-off method are described, by means of which the dependence of the viscosity of oils and other nonvolatile fluids on the distance from the solid wall can be measured, and the viscosity localized with an accuracy of 10 Å. Results prove that the solid wall is capable of altering the orientation of the molecules in adjacent layers of the liquid up to 10^{-5} cm. thick, and even up to 10^{-3} cm. thick in the case of polymeric liquids.

9669* The Extreme-Pressure Lubricating Properties of Some Sulphides and Disulphides, in Mineral Oil, as Assessed by the Four-Ball Machine. W. Davey and E. D. Edwards. *Wear*, v. 1, no. 4, Feb. 1958, p. 291-304.

Disulfides are superior to monosulfides as extreme-pressure additives; the mechanism of action of these compounds is discussed.

9670* Wear of Metals. F. T. Barwell. *Wear*, v. 1, no. 4, Feb. 1958, p. 317-332.

Factors influencing wear. Characteristics of rolling contact wear, scuffing, fretting corrosion, and simple sliding with and without 0. Wear in engine cylinders, engine bearings, and gears.

9671* A Review of the Friction of Solids. F. P. Bowden. *Wear*, v. 1, no. 4, Feb. 1958, p. 333-346.

Summary on friction of metals and non-metals, friction at very small displacements, model junction experiments, calculation of frictional forces, stick-slip problems, statistical treatment of frictional problems, friction and metal transfer, and molecular array in a low-friction solid.

See also: **9769** (die casting lubricants); **9771** (antifriction properties of chlorided steels); **9814** (cold-rolling lubricants); **9827** (wear in metal working tools); **9831** (rolling lubricants); **9832** (rolling lubricants); **10110** (abrasion resistance of plastics).

MECHANICAL ENGINEERING

9672 Advances in Applied Mechanics. H. L. Dryden and Th. von Kármán, editors. v. V. 459 pp. 1958. Academic Press, New York. (TA350 Ad95 Vis.)

Papers on supersonic air ejectors, unsteady airfoil theory, theory of distributions, stress wave propagation in rods and beams, hydromagnetics, mechanics of granular matter, and condensation in supersonic and hypersonic wind tunnels.

9673* (Russian.) Creep of Composite Cylindrical Pipes. **Polzuchest' sostavnykh tsilindricheskikh trub.** N. Kh. Arutiunian and M. M. Manykiah. *Akademiia Nauk Armianskoĭ SSR, Izvestiia. Seriia Fiziko-Matematicheskikh Nauk*, v. 10, no. 6, 1957, p. 41-58.

Theoretical study of equilibrium of heterogeneous cylindrical pipes (such as reinforced concrete, built-up metals, wood, etc.) under uniform internal and external pressures. Solution is based on non-linear theory of creep.

9674* A Statistical Model for Life-Length of Materials. Z. W. Birnbaum and S. C. Saunders. *American Statistical Association, Journal*, v. 53, no. 281, Mar. 1958, p. 151-160.

Model of structures under dynamic loading makes it possible to express the probability distribution of life-lengths in terms of the load given as a function of time and of deterioration occurring in time independently of loading.

9675 (German.) Efficiency and Irreversibility of Simple Epicyclic Gear Trains. **Wirkungsgrad und Selbsthemmung Einfacher Umlaufgetriebe.** Bengt Carlsson and Hans Larsson. *Chalmers Tekniska Högskolas Handlingar*, no. 186, 1957, 48 pp. (T4 C35t Contin.)

Deals with gear trains in which all three members are rotating.

9676* (English.) **Researches on Threaded Connections. II. The Effect of the Fineness of Thread on the Elastic Concentrated Stress in a Bolt Assembled With a Nut in Tension.** Shoji Shimamura and Yusei Noguchi. *Journal of Mechanical Laboratory of Japan*, v. 3, no. 2, 1957, p. 70-80.

9677 Spring Design Charts. I. Extension Springs. H. J. Boll. *Machine Design*, v. 30, Apr. 17, 1958, p. 137-145.

A fast graphical method for design of helical-wire extension springs.

9678* (French.) Effects of Electronic Controls on Machine Design. **Influence des asservissements électroniques sur la conception des machines.** R. Moreau. *Recherche Aéronautique*, 1958, no. 62, Jan.-Feb., p. 37-44.

A study of electronic and mechanical interactions in planning machines; functional and parasitic interactions and their consequences. Effects of dry friction on precision and stability.

9679 Analysis of Stresses and Deflections in a Disk Subjected to Gyroscopic Forces. M. H. Hirschberg and A. Mendelson. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4218, Mar. 1958, 37 pp. (TL570 Un3t Vis.)

Differential equations governing the stresses and deflections of a disk variable thickness subjected to gyroscopic loading are derived. For a disk of constant thickness, solutions are obtained by a finite-difference method for a wide range of disk geometry and loading.

See also: **9422** (electronic synthesis of flexible beams); **10069** (plastic chain coupling).

METALLURGY

9680* (Russian.) Application of Vacuum Processes in the Metallurgy of Non-Ferrous Metals. **O primenenii vakuumnykh protsessov v metallurgii tsvetnykh metallov.** I. A. Onaev, M. A. Abdeev, V. S. Esiutin, and V. A. Vasil'eva. *Akademiia Nauk Kazakhskoĭ SSR, Vestnik*, v. 14, no. 1, Jan. 1958, p. 40-47.

A survey article.

9681* Steels at Elevated Temperatures With Special Reference to the Use of Molybdenum. J. D. Murray. *Alloy Metals Review*, v. 9, no. 87, Mar. 1958, p. 2-8.

Oxidation and corrosion resistance, mechanical properties, weldability, creep resistance, and creep ductility are considered, with emphasis on the creep properties.

9682* (German.) Steel as Base Material for Hard-Metal Reinforced Tools Used in the Mining Industry. **Der Stahl als Trägerwerkstoff für hartmetallbestückte Bergbauwerkzeuge.** F. Fechter and E. Oberdorfer. *Berg- und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben*, v. 103, no. 2, Feb. 1958, p. 26-28.

9683* Tantalum as a Corrosion Resistant Material. F. G. Cox. *Corrosion Prevention and Control*, v. 5, Mar. 1958, p. 44-48.

Properties and applications; resistance to corrosion in aqueous media, liquid metals, gases at elevated temperatures, and the atmosphere at room temperature.

9684 A Study of Aluminum-Uranium Alloys Containing Up to 45 w/o Uranium. Norman E. Daniel, Ellis L. Foster, and R. F. Dickerson. *Engineers Joint Council, Nuclear Engineering & Science Conference Preprint* 31, 1958, 14 pp. (TK9006 En34p Vis.)

Many of the properties possessed by high-uranium alloys are comparable to those exhibited by a 16 w/o uranium alloy. Melting and casting studies showed that acceptable castings of Al-U alloys with high-uranium contents can be produced by a single melting technique. Fabricability and corrosion resistance of the alloys were studied.

9685* (Hungarian.) Production and Properties of Uranium Metal. **Az urániumfém előallitása és tulajdonságai.** Rezsö Hantos. *Kohászati Lapok*, v. 13, no. 1, Jan. 1958, p. 27-33.

Fuel and fissionable materials. Mining, refining, and properties of U ores. Stability of the metal at different temperatures. Increase of U hardness upon temperature increase; corrosion weight increase at 200 C and corrosion behavior.

9686 Aluminium Piston Alloys in Germany. *Light Metals*, v. 21, Mar. 1958, p. 85-88.

Eutectic and hypereutectic Al-Si alloys; hypereutectic alloy with very high Si content. Influence of alloy variation on thermal expansion.

9687 (French.) Effect of Phosphorus on the Quality of A-S13. **Influence du phosphore sur la qualité de l'A-S13.** Louis Grand. *Revue de l'Aluminium*, v. 35, no. 251, Feb. 1958, p. 171-179.

The spectrographic method of dosage is preferred. Phosphorus does not seem to cause shrinkage, but other elements, especially Ca, do.

9688* (Czech.) Heat Resisting Cast Steels and Their Design Characteristics. **Žárupevné ocele na odlitky a jejich konstrukční charakteristiky.** Karel Löbl and Miloš Vystyd. *Slévárenství*, v. 6, no. 3, Mar. 1958, p. 72-77.

Deals with the present state of heat resisting cast steels destined for power stations of very high parameters. Values of safety coefficients and other calculation characteristics for designing parts working at high pressures are recommended. The austenitic steels for castings which can be used permanently at temperatures up to 650 C are considered.

See also: **9942** (fabrication of Zr-clad reactor fuel elements).

METALS—CORROSION

9689 (English.) **The Oxidation of Tantalum at 50-300 C.** D. A. Vermilyea. *Acta Metallurgica*, v. 6, Mar. 1958, p. 166-171.

The thicknesses of oxide films formed in O were estimated from measurements of the electrical capacitance of the films after oxidation.

9690 (French.) The Kinetics of the Air Oxidation of Iron in the Range 700-1250 C. **Sur la cinetique de l'oxydation du fer dans l'air dans l'intervalle 700-1250 C.** J. Païdassi. *Acta Metallurgica*, v. 6, Mar. 1958, p. 184-194.

The scale is always composed of three continuous and compact layers of Fe_2O_3, Fe_3O_4, and FeO. Under isothermal oxidation conditions, the growth law of these layers is parabolic, except during the initial unstable stage. The relative thicknesses of the layers vs. the total thickness are respectively 1, 4, and 95%.

9691* (Czech.) Corrosion Studies. **Studium Korose. XVI.** Effect of the Rate of Penetration of Water Vapor Through Oil Films on the Corrosion of Steel Protected by Layers of Oil. **O vlivu rychlosti pronikání vodní páry olejovými filmy na korosi oceli chráněné vrstvami olejů.** Robert Bartoníček. **XVII.** Effect of Hydrogen Sulfide on the Corrosion of Aluminum. **Vliv sirovodíku na korosi hliníku.** Karel Smrček, Ivan Sekerka, and Vladimír Seifert. *Chemické Listy*, v. 52, no. 2, Feb. 1958, p. 190-200.

9692 Corrosion Inhibition by Organic Amines. Helmut Kaesche and Norman Hackerman. *Electrochemical Society, Journal*, v. 105, Apr. 1958, p. 191-198.

Corrosion rates of pure Fe in 1NHCl with and without inhibition by aniline, several aniline derivatives, and alkylamines were determined by cathodic polarization measurements as well as by colorimetric analysis of the solution.

9693* (Russian.) The Electric Protection of Power Cables From Corrosion. **Elektricheskaia zashchita silovykh kabelei ot korrozii.** N. A. Tsekun. *Energeticheskii Biulleten'*, 1958, no. 3, Mar., p. 1-5.

Suggests building-up a negative potential on the Pb coatings of cables.

9694 Corrosion Screening of Component Materials for NaK Heat Exchange Systems. Samuel J. Basham, John H. Stang, and Eugene M. Simons. *Engineers Joint Council, Nuclear Engineering & Science Conference Preprint* 24, 1958, 25 pp. (TK9006 En34p Vis.)

Sixty-one materials which might be useful for special components, such as valve-seat inserts, valve plugs, shaft-seal facings, and bearings, in high-temperature NaK flow systems were screened in tilting-furnace corrosion experiments. These include high-temperature alloys, pure metals, cermets, and ceramics.

9695* (German.) Corrosion Inhibitors and Their Special Application. **Über Korrosionsinhibitoren und ihre spezielle Anwendung.** Karl-Hermann List. *Erdol und Kohle*, v. 11, no. 2, Feb. 1958, p. 86-88.

Elaborates on problems concerning selection of corrosion inhibitors for the oil industry.

9696 The Corrosion of Lead by Bromine and Its Prevention. M. R. Bloch, D. Kaplan, and J. Schnerb. *Journal of Applied Chemistry*, v. 8, pt. 3, Mar. 1958, p. 171-174.

Corrosion is due to HBr and can be prevented by the addition of oxidizing agents (especially PbO_2) or by anodic oxidation of the Pb surface.

9697 Corrosion of Steel. I. Protective Action of Oxides of Lead & Zinc. II. Inhibitive Behaviour of Chromates, Molybdates & Tungstates of Zinc & Lead. A. K. Choudhury and S. C. Shome. *Journal of Scientific & Industrial Research*, v. 17, sec. A, Jan. 1958, p. 30-38.

9698 Accelerated High Temperature Oxidation Due to Vanadium Pentoxide. K. Sachs. *Metallurgia*, v. 57, Mar. 1958, p. 123-137.

Oil ash and its constituents. Corrosion effects in gas turbines due to high V_2O_5 content. Laboratory studies on effects of time, temperature, quantity of V_2O_5, and other constituents. (To be continued.)

9699* Atmospheric Exposure Tests of Different Types of Electrodeposited Nickel. J. Edwards. *Product Finishing*, v. 11, Mar. 1958, p. 58-66.

The protection afforded to steel pressings by deposits of different types of Ni under Cr was investigated, together with the outdoor corrosion resistance of detached Ni deposits without a Cr top coat.

9700 Antifreeze Corrosion Testing. J. R. Heard, J. W. Compton, and M. A. Boehmer. *Soap and Chemical Specialties*, v. 34, Mar. 1958, p. 97 + 2 pages.

Specimen holder for metal corrosion coupons mountable in automobile engines yields data on cooling systems that contain antifreeze.

9701* Corrosion of Mild Steel in Alkaline Pulping Liquors. I. Kraft White Liquor. Richard B. Kesler and James F. Bakken. **II. Neutral Sulphite Cooking Liquor.** Richard B. Kesler. *Tappi*, v. 41, Mar. 1958, p. 97-109.

9702* (English.) **Fretting Corrosion and Fatigue Failure.** C. E. Phillips. *Teknisk Ukeblad*, v. 105, no. 13, Mar. 27, 1958, p. 281-286.

Causes and prevention of fretting corrosion; effect on fatigue strength.

9703* (Swedish.) The Corrosion of "Reflektal" in Water at 200 C. **Reflektals korrosion i vatten vid 200°C.** Lennart Pergelins and Uno Trägärdh. *TVF. Teknisk-Vetenskaplig Forskning*, v. 29, no. 1, 1958, p. 28-36.

Some 750 mm^3 specimens of "reflektal" (99.99% Al with a 0.52% Mg addition), hard-drawn and with a 44 $H_V/_5$ hardness were tested for the corrosive effect of the pH of water at 200 C and of Ni^{2+}-ions.

9704* (Russian.) Micro-Electrochemical Method of Investigation of Metal Corrosion Under Stress. **Mikroelektrokhimicheskii metod issledovaniia korrozii metalla pod napriazheniem.** A. V. Riabchenkov, V. M. Nikiforova, and V. F. Abramova. *Zavodskaia Laboratoriia*, v. 24, no. 2, 1958, p. 167-173.

Experimental investigation of nodular cast iron, in the quenched and stabilized state, and stabilized malleable steel.

See also: **9411** (coal tar coatings for underground metal); **9460** (Pt faced Ti electrodes); **9683** (corrosion resistance of Ta); **9795** (gas corrosion effect on cyclic strength in austenitic steel).

METALS—EXTRACTION AND REFINING

9705* (Russian.) Processes in Blast Furnace Boshes During Smelting With Oxygen-Enriched Blast. **Protsessy v zaplechikakh domennoi pechi pri plavke na obogashchennom kislorodom dut'e.** I. P. Bardin and M. Ia. Ostroukhov. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Tekhnicheskikh Nauk*, 1958, no. 2, Feb., p. 7-14.

Analyses of gas and materials; effect of temperature and other factors on the refining process.

9706* (French.) The Van Arkel Process for the Industrial Preparation of Zirconium. **Préparation industrielle du zirconium Van Arkel.** Nguyen Thien-Chi, M. Picardeau, and J Vergnolle. *Annales de Radioélectricité*, v. 13, no. 51, Jan. 1958, p. 30-55.

Successive stages of the process: preliminary study in sealed glass tube; laboratory trials in demountable metal tubes; and finally, production in industrial demountable tubes. Automatic regulation of the Zr deposit on the initial seed.

9707* (Russian.) On the Iodide Method for Purifying Zirconium. **K voprosu ob iodidnom metode ochistki tsirkoniia.** K. D. Sinel'nikov, F. I. Busol, and G. I. Stepanova. *Atomnaia Energiia*, v. 4, no. 2, Feb. 1958, p. 169-174.

Review of equipment, methods, and theory.

9708* Production of Low Phosphorus Foundry Iron and From High Phosphorus Iron Ores. R. I. Higgins and J. C. Billington. *B.C.I.R.A. Journal of Research and Development*, v. 7, no. 4, Feb. 1958, p. 171-187 + 3 plates.

Dephosphorization followed by recarburization in a Kaldo converter.

9709 Blast Furnace, Coke Oven, and Raw Materials Committee of the Iron and Steel Division, Metallurgical Society of the American Institute of Mining, Metallurgical, and Petroleum Engineers, Proceedings. v. XVI. 276 pp. 1958. American Institute of Mining, Metallurgical, and Petroleum Engineers, New York. (TN713 Am35 Vis.)

A compilation of 22 papers pertaining to blast furnace theory and practice, coke plant operation, ore agglomeration, and by-products.

9710 True Function of Manganese in Basic Open-Hearth Steelmaking Process. J. Natkaniec. *Henry Brutcher Translation No.* 3625, 15 pp. (From *Hutnik* (Poland), v. 21, no. 10, 1954, p. 329-335.) Henry Brutcher, Altadena, Calif.

The Mn content in the charge probably has no influence on the O content in the steel bath and has only a slight influence on the Mn content at meltdown. Lime slag should be formed as early as possible in the process of melting. Optimum degree of basicity for best utilization of Mn is about 2.5.

9711 Use of Compressed Air for a Sharper Flame in the Open-Hearth Furnace. M. G. Kozhanov and G. B. Rogov. *Henry Brutcher Translation No.* 3916, 5 pp. (From *Metallurg*, v. 1, no. 7, 1956, p. 18-21.) Henry Brutcher, Altadena, Calif.

Compressed air fed through an injector into the bulkhead of the gas flues results in a sharper and flatter flame and much better mixing of air and gas in the melting chamber. Total heating time is reduced.

9712 Influence of Alloying Elements on Hydrogen Content and Hydrogen Mobility in Steel. Iu. A. Klyachko and T. A. Izmanova. *Henry Brutcher Translation No.* 4047, 8 pp. (From *Stal*, v. 17, no. 6, 1957, p. 507-511.) Henry Brutcher, Altadena, Calif.

Study of effect of Ti, Si, C, Mn, and Zr on H content of as-cast and as-forged specimens of steel and on rate of H effusion during holding at room temperature for various periods of time.

9713 Study of Conditions of Heat Exchange and Reduction in Blast Furnaces Working on Fluxed Sinter. N. N. Babarykin and F. A. Yushin. *Henry Brutcher Translation No.* 4066, 24 pp. (From *Stal'*, v. 17, no. 1, 1957, p. 7-15.) Henry Brutcher, Altadena, Calif.

Search for new ways of increasing blast furnace production, based on study of effect of fluxed sinter on thermal and chemical processes occurring in the blast furnace.

9714 Influence of Catalysts on the Reduction of Iron Ores With Hydrogen. W. Machu and S. Y. Ezz. *Henry Brutcher Translation No.* 4067, 12 pp. (From *Archiv f.d. Eisenhüttenwesen*, v. 27, no. 7, 1957, p. 367-371.) Henry Brutcher, Altadena, Calif.

Copper, Ni, and Pt have a decided positive and tungstates a decided negative action. Several other substances have small positive or negative effects. The catalytic effects are only appreciable at 250-400 C. Temperatures of roasting after impregnating the ore with the catalyzing salt has a marked effect.

9715 Intensification of the Sintering Process by Burning Limestone on Top of Sinter Bed (for Later Use of Resulting Lime in Sinter Mix). D. A. Kissin and A. V. Drimbo. *Henry Brutcher, Translation No.* 4068, 14 pp. (From *Stal'*, v. 17, no. 10, 1957, p. 868-873.) Henry Brutcher, Altadena, Calif.

9716 Device for Direct Growing of Crystals From High-Reactivity Metal Powders. D. A. Petrov and Iu. M. Shashkov. *Henry Brutcher Translation No.* 4074, 4 pp. (From *Izvestiia Akademii Nauk SSSR, Otd. Tekhn. Nauk*, no. 5, May 1957, p. 102-103.) Henry Brutcher, Altadena, Calif.

Powdered material is fed onto the fused tip of a primer or seed. Seed and inductor coil are lowered in accordance with the rate of feed of the material. No crucible is used, hence contamination is prevented.

9717 Fundamental Considerations About the Production of High-Grade Killed Steel. H. Schenck. *Henry Brutcher Translation No.* 4079, 30 pp. (From *Stahl und Eisen*, v. 77, no. 21, 1957, p. 1442-1450.) Henry Brutcher, Altadena, Calif.

A discussion of how defects can be minimized by suitable furnace and ladle practices.

9718 New Deoxidizing and Desulfurizing Practice for Improved Steel Quality. V. A. Skachko and N. P. Merenkov. *Henry Brutcher Translation No.* 4080, 7 pp. (From *Stal*, v. 17, no. 6, 1957, p. 521-522.) Henry Brutcher, Altadena, Calif.

Experiments on ladle deoxidation of steel with Al-filled tubes immersed in the metal. Desulfurizing effects; S in steel as function of CaO/SiO_2 ratio of slag.

9719 Sources of Oxide Inclusions in Steel During Tapping and Pouring. E. N. Malinovskii and A. N. Morozov. *Henry Brutcher Translation No.* 4081, 11 pp. (From *Izvestiia Akademii Nauk SSSR, Otdel. Tekhn. Nauk*, no. 8, Aug. 1957, p. 102-108.) Henry Brutcher, Altadena, Calif.

Oxide inclusions in finished steel mainly result from oxidation of strong deoxidizers during ingot pouring and solidification. Their content can be decreased by lowering the dissolved O content of the steel in the ladle and by preventing secondary oxidation during pouring.

9720 Increased Sintering Rates Obtained by Modifying the Mixing Technique. A. E. Lebedev. *Henry Brutcher Translation No.* 4083, 4 pp. (From *Metallurg*, v. 2, no. 5, 1957, p. 8.) Henry Brutcher, Altadena, Calif.

Benefits resulting from a change in the conventional mixing technique: all the ore is charged first and any necessary coke breeze is added later.

9721 Possibilities of Producing Sponge Iron in Batch-Type Chamber Furnaces (Coke Ovens). M. S. Kurchatov. *Henry Brutcher Translation No.* 4085, 19 pp. (From *Neue*

Hütte, v. 2, no. 11, 1957, p. 671-678.) Henry Brutcher, Altadena, Calif.

Experiments on the production of dense, strong sponge iron by reduction of pure ores of various reducibilities with several kinds of solid fuel demonstrate the practical possibility of producing sponge iron in coke-oven-type furnaces.

9722 Elimination of Copper From Molten Pig Iron. K. Ueno, O. Yasukabe, and M. Inoue. *Henry Brutcher Translation No.* 4101, 4 pp. (From *Tetsu to Hagané*, v. 43, no. 3, 1957, p. 265-266.) Henry Brutcher, Altadena, Calif.

Study of conditions under which Na_2S or Na_2SO_4 can be used.

9723 Equilibria Between Titanium Metal and Solutions of Titanium Dichloride in Fused Magnesium Chloride. K. Komarek and P. Herasymenko. *Electrochemical Society, Journal*, v. 105, Apr. 1958, p. 210-215.

A method was developed for collecting vapors over solid $TiCl_2$ or over mixtures of $TiCl_2$ and $MgCl_2$ in a specially designed Ti pipette at elevated temperatures. Thermal analyses in the $MgCl_2$-$TiCl_2$ system were carried out.

9724 (Russian.) A Contribution to the Theory of the Electric Circuit of a Three-Phase Thermal Ore Furnace. **K teorii elektricheskoi tsepi trekhfaznoi rudnotermicheskoi pechi.** N. A. Markov. *Elektrichestvo*, 1958, no. 1, Jan., p. 10-13.

Owing to the resistance of the charge and the layer, the curve of the furnace voltage and of the current in the electric circuits of thermal ore furnaces is not sinusoidal. This distinguishes these furnaces from electric steel furnaces.

9725 Vacuum Melting and Heat Treating. I. Roger Giler. *Industrial Heating*, v. 25, Mar. 1958, p. 480 + 8 pages.

A review of vacuum equipment. (To be continued.)

9726* The Use of Electromagnetic Stirring in Zone Refining. J. B. Mullin and K. F. Hulme. *Journal of Electronics and Control*, v. 4, no. 2, Feb. 1958, p. 170-174.

Optimum removal of an impurity during zone refining may be achieved even at high rates of traverse by use of stirring in the molten zone produced by a magnetic field rotating at 400 c/s.

9727* (Hungarian.) The Metallurgical and Economic Aspects of Steam Injection on Blast-Furnace Operation. **A gőzbefúvás metallurgiai és gazdasági hatása a nagyolvasztó üzemére.** Ottō Farkas. *Kohászati Lapok*, v. 13, no. 1, Jan. 1958, p. 1-6.

Survey of steam injection tests. Thermal effects with natural and steam-injected blast. Effects of moist vs. dry steam.

9728* (Russian.) Utilizing Oxygen in Small Converters. **Primenenie kisloroda v malykh konvertorakh.** B. A. Andreev. *Liteinoe Proizvodstvo*, 1958, no. 3, Mar., p. 4-7.

Describes test in a cupola furnace with an iron of the following composition: 2.6 to 3.4% C; 0.6 to 1.0% Si; 0.5 to 0.8% Mn; 0.05 to 0.08% P; and 0.05 to 0.06% S.

9729* (Russian.) Effect of Refractory Materials on the Contamination of Rimmed Steel by Non-Metallic Impurities. **Opredelenie roli ogneuporov v zagriaznenii kipiashchei stali nemetallicheskimi vkliucheniiami.** M. I. Tsekhanskii, K. B. Khusnoiarov, and G. D. Susloparov. *Ogneupory*, v. 23, no. 2, 1958, p. 82-87.

9730 The Ultimate Distribution of Impurity in the Zone-Melting Process. L. W. Davies. *Philosophical Magazine*, v. 3, no. 26, Feb. 1958, p. 159-162.

Mathematical analysis.

9731 Proceedings of the Fortieth Conference, National Open Hearth Steel Committee of the Iron and Steel Division, A.I.M.E., Pittsburgh, Pennsylvania, April 8 to 10, 1957. v. XL. 339 pp. 1958. American Institute of Mining, Metallurgical, and Petroleum Engineers, New York. (TS1 Am35p Vis.)

These 33 papers deal with various aspects of basic and acid operations, operating metallurgy, refractories and masonry, cold metal and basic foundry practice, furnace operation and combustion, and physical chemistry of steelmaking.

9732* (Russian.) Melting of Steel From Low-Manganous Iron. **Vyplavka stali iz malomargantsovistogo chuguna.** P. G. Glazkov, A. M. Ofengenden, I. I. Druzhinin, R. P. Nesterovich, and G. T. Chepurnoi. *Stal'*, v. 18, no. 3, Mar. 1958, p. 209-213.

Melting process may be improved considerably by using S-free coke oven gas, for firing open-hearth furnaces.

9733* (Russian.) Desulfurization of Steel in the Ladle. **Udalenie sery iz stali v kovshe.** A. S. Tochinskii and N. V. Popova. *Stal'*, v. 18, no. 3, Mar. 1958, p. 214-218.

A 35-45% reduction of the S content of steel with some improvement of the metal quality can be obtained by treating the acid or basic metal with white or aluminous slags.

9734* (Russian.) Deoxidation of Killed Steel in a Ladle by Ferroaluminum. **Raskislenie spokoinoi stali v kovshe ferroaliuminiem.** I. N. Lad'ianov. *Stal'*, v. 18, no. 3, Mar. 1958, p. 218-223.

A process replacing the addition of Al improves the quality of steel.

9735* (Russian.) Effect of Aluminum on Specific Losses of Transformer Steel. **Vliianie aliuminiia na udel'nye poteri transformatornoi stali.** *Stal'*, v. 18, no. 3, Mar. 1958, p. 248-248.

When melting transformer steel which will be treated by high temperature annealing, Al additions to the metal should be avoided during deoxidation and during alloying with ferrosilicon.

See also: **9157** (life of high alumina-clay checker brick in regenerators); **9174** (separating Cu from Ni-bearing solutions); **9190** (processing nuclear fuels); **9347** (separation of U and Th); **9569** (composition of blast furnace gas); **9765** (desulfurization of iron).

METALS—FINISHING, POLISHING, AND CLEANING

9736 The Dollars and Sense of Pickle-Liquor Treatment. James S. Joseph and E. T. Culver. *Iron and Steel Engineer*, v. 35, Mar. 1958, p. 112-122.

Four processes in commercial operation today provide simple and direct solutions to waste pickle liquor disposal problems.

9737* Metal Polishing Developments. D. J. Fishlock. *Mechanical World and Engineering Record*, v. 138, Mar. 1958, p. 102-106; Apr. 1958, p. 180-184.

New polishing techniques, improvements in the use of mops, bobs, and belts, and the technical and economic advantages and limitations of new "self-polishing" plating processes, automatic polishing, vapor-blast smoothing, barrel finishing, and chemical and electrolytic buffing treatments.

9738* (Dutch.) Preliminary Examination of the Blast Cleaning of Steel Work. **Vooronderzoek straalreiniging van staalconstructies.** J. H. Zaat. *Metalen*, v. 13, no. 5, Mar. 15, 1958, p. 81-88.

Life of the blasting agent. Determination of the splintering capacity. Exposure tests revealed no relationship between rusting and grain size of the blasting agent. The least rust was shown by specimens blasted with steel wire, sand, and Zr sand.

9739 Cleaning Molybdenum. *Metal Industry*, v. 92, no. 11, Mar. 14, 1958, p. 211.

Improved method for removing oxides prior to fabrication.

9740 Electrolytic Descaling of Titanium. *Metal Industry*, v. 92, no. 14, Apr. 4, 1958, p. 270.

Process for removing oxide deposits after heat-treatment.

9741 Chelating Agents, Their Value and Applications in Metal Finishing. D. J. Fishlock. *Metal Industry*, v. 92, no. 14, Apr. 4, 1958, p. 271-273.

Use in metal cleaning, inactivating metallic impurities in plating solutions, and preparation and analysis of plating solutions.

9742* Slide-Honing. A New Barrelling Technique. Charles Emerson. *Metalworking Production*, v. 102, no. 11, Mar. 14, 1958, p. 453-455.

Precision barrelling technique confines parts to sliding and rolling actions that remove stock accurately, without danger of damage.

9743 Cleaning and Preparation of Metals Prior to Electroplating: Effect of Oxide Films. X. Experimental Results. Henry B. Linford and David O. Feder. *Plating*, v. 45, Apr. 1958, p. 349-359.

Results obtained in plating Ni from a Watts type plating bath onto oxidized Cu cathodes.

See also: **9626** (bibliography on metal finishing); **9833** (pickling of steel strips).

METALS—FOUNDRY PRACTICE

9744* (Portuguese.) Pig Iron for the Production of Ductile Iron. **Ferro gusa para a produção de ferro dúctil.** Horace A. Hunnicutt. *ABM (Boletim de Associaçao Brasileira de Metais)*, v. 14, no. 50, Jan. 1958, p. 19-29.

Physical properties of ductile iron compared with other materials. Chemical composition in relation to the formation of spheroidal graphite; a specification concerning a pig iron suitable for ductile iron.

9745* (Portuguese.) The Use of Wet vs. Dry Clay in Molding Sand Agglomeration. **Areias de moldagem aglomeradas com argilas úmidas em comparação com argilas sêcas.** Victor Lo Ré. *ABM (Boletim da Associaçao Brasileira de Metais)*, v. 14, no. 50, Jan. 1958, p. 53-62.

Adding wet clay gives superior strength and hardness.

9746* Further Studies on Some Factors Influencing Sinking Under Bosses on Thin Plates. The Role of Eutectic Nucleation. A. G. Fuller. *B.C.I.R.A. Journal of Research and Development*, v. 7, no. 4, Feb. 1958, p. 157-170 + 14 plates.

Effect of Mn, S, inoculation with ferro-silicon, superheating temperature, and furnace holding time upon sinking. A relationship between the degree of nucleation of the melt (as determined by eutectic cell counts) and sinking is indicated.

9747* An Investigation of the Flow of Foundry Alloys With Various Gating Systems Used in Sand Moulding. M. Jeancolas. *British Foundryman*, v. 51, pt. 3, Mar. 1958, p. 119-127.

9748* Instrumentation for the Melting of Non-Ferrous Metals. D. W. Brown. *British Foundryman*, v. 51, pt. 3, Mar. 1958, p. 128-136.

Instruments for fuel supplies, combustion control, degassing, and pyrometry.

9749* The Influence of pH Variation in Foundry Moulding-Materials on the Surface Finish of Steel Castings. D. H. Houseman. *British Foundryman*, v. 51, pt. 3, Mar. 1958, p. 149-155.

9750 Influence of the Delivery Pressure on Quality of Pressure Die Castings. F. Richter. *Henry Brutcher Translation No.* 4050, 21 pp. (From *Giesserei*, v. 43, no. 18, 1956, p. 540-547.) Henry Brutcher, Altadena, Calif.

Influence of die life on cost of pressure die castings. Best position and design of gate. Reduction of delivery pressure to avoid overloading of die and improve quality of castings. Effect of delivery pressure on mechanical properties and density of castings.

9751* Quality Control in Cupola Melting. R. A. Short. *Canadian Metalworking*, v. 21, Mar. 1958, p. 30 + 4 pages.

9752* (Italian.) The Cupola Furnace Theory. **Teorie del cubilotto.** W. Patterson. *Fonderia*, v. 7, Jan. 1958, p. 13-19.

Statistical description of a cupola furnace with a 1200 mm. internal diameter at the tuyere level. Behavior of iron, coke, and limestone. Theoretical possibility for the crucible zone, zone rich in O, reduction zone, and preheating zone, and for other factors to influence the results of the melting process.

9753* (Italian.) "Meehanite" Castings, an Interesting Material for the Mechanical Constructor. **La ghisa "meehanite" un interessante materiale per il costruttore meccanico.** Alfredo Secciani. *Fonderia*, v. 7, Feb. 1958, p. 61-73.

Different types of meehanite and typical applications. Effects of chemical composition and subcooling on graphitizing. Fatigue, wear, strength, and other properties.

9754* (Italian.) Using Anodized Metallic Molds in Casting. **Fusione di getti con impiego di forme metalliche anodizzate.** *Fonderia*, v. 7, Feb. 1958, p. 74-76.

Chills are used instead of sand molds.

9755* (Italian.) Recent Studies on Cores Agglomerated With Sodium Silicate. **Recenti studi sulle anime agglomerate con silicio di sodio.** *Fonderia*, v. 7, Mar. 1958, p. 97-100.

Importance of the silicate composition, humidity of the mixtures, and ratio SiO_2/Na_2O.

9756* (Italian.) Quality Control in Die Casting. **Il controllo della qualità nella fusione sottopressione.** *Fonderia*, v. 7, Mar. 1958, p. 113-117.

Principal defects found in castings of Al, Mn, and Zn alloys. Thermal changes and metal flow in the die.

9757 Problems in Making Stainless Steel Castings. Ernest A. Schoefer. *Foundry*, v. 86, Apr. 1958, p. 114-119.

Some of the problems encountered by producers of heat-, corrosion-, or abrasion-resistant Fe-Cr and Fe-Cr-Ni alloys.

9758 Influence of Blast Input, Coke Size and Melting Coke Ratios on Cupola Performance. F. Danis and M. Decrop. *Foundry Trade Journal*, v. 104, Mar. 20, 1958, p. 319-325; Mar. 27, 1958, p. 351-358.

(Translated from the French.) Tests with four different size ranges of coke. Factors such as the presence of distinct temperature zones in the cupola, coke quantity and size, loss of heat through gases and various secondary influences are examined and defined with the aid of graphs.

9759* (Swedish.) Design of Castings With Regard to Pouring. **Konstruktionsanvisningar för gjutgods. IV.** Alrik Östberg. *Gjuteriet*, v. 48, no. 3, Mar. 1958, p. 33-36.

Practical measures, such as reduced wall thickness, gate and riser positioning, and reinforcement rib design are considered.

9760* (Russian.) High-Frequency Induction Core Drying. **Sushka sterzhnei v elektricheskom pole vysokoi chastoty.** Iu. P. Vasin. *Liteinoe Proizvodstvo*, 1958, no. 2, Feb., p. 7-10.

9761* (Russian.) Certain Factors Influencing Formation of Hot Cracks in Molded Steel. **O nekotorykh faktorakh, vliiaiushchikh na obrazovanie goriachikh treshchin v stal'nykh otlivkakh.** A. M. Liass and Chzhou-iao-kho. *Liteinoe Proizvodstvo*, 1958, no. 3, Mar., p. 20-24.

Effect of mold parameters on shrinkage of castings and the stresses initiated during solidification.

9762 Progress in Titanium Casting. John V. E. Hansen and Philip J. Clough. *Machine Design*, v. 30, Apr. 17, 1958, p. 28-30.

Use of expendable graphite molds and skull casting techniques now permit commercial vacuum casting of small Ti parts.

9763* Castings. *Mechanical Engineering*, v. 80, Apr. 1958, p. 61-71.

Papers deal with process controls for making turbine castings, design characteristics of magnetic steel castings, use of nondestructive testing on steel castings for elevated temperature service, and a 225,000 psi. wear-resistant commercial cast steel.

9764 Control of Die-Casting Machines. *Metal Industry*, v. 92, no. 13, Mar. 28, 1958, p. 247-251.

Electronic controls and safety devices are reviewed.

9765* (Russian.) The Desulfurization of Cast Iron Outside of the Blast Furnace. **Vnedomennoe obesserivanie chuguna.** M. I. Gromov, et al. *Metallurg*, v. 3, no. 3, Mar. 1958, p. 3-6.

Desulfurization in a rotary furnace is recommended. Lime used should contain a minimum of SiO_2 and CO_2; its grain size should be less than 1 mm, and it should not exceed 1% of the weight of cast iron.

9766* Effect of Pressure During Solidification on Microporosity in Aluminum Alloys. S. Z. Uram, M. C. Flemings, and H. F. Taylor. *Modern Castings*, v. 33, Apr. 1958, p. 63-68.

Aluminum alloys 356 and 195 were solidified under pressures varying from atmospheric to 250 psi. Pressures greater than atmospheric resulted in a substantial reduction of microporosity in sand cast test specimens.

9767* Foundry Characteristics of a Rammed Graphitic Mold Material for Casting Titanium. H. W. Antes, J. T. Norton, and R. E. Edelman. *Modern Castings*, v. 33, Apr. 1958, p. 69-76.

Satisfactory expendable molds for Ti can be prepared from a 6% water mixture by using a minimum molding pressure of 100 psi.

9768* (Hungarian.) The Properties of Phenolic-Resins and the Phenolic Sand System, Used in the Shell Molding Process. **A héjformázáshoz használt fenolgyanták és a fenolgyantahomok rendszer tulajdonságai.** Gyözö Ambrus, György Hevenesi, and János Szekeres. *Öntöde*, v. 9, no. 1, Jan. 1958, p. 1-5.

Testing the bending strength, softening point, free phenol and water content, hardening time, and grain size. Effects of the quantity of resin, quality of sand, and heating conditions on shell molding strength.

9769 Die Casting Lubricants, Their Purpose and Use. R. D. Black. *Precision Metal Molding*, v. 16, Apr. 1958, p. 37-39.

Soluble oil, boron nitride, Al, and Zn lubricants are discussed.

9770 (English, French, and German.) **24th International Foundry Congress. v. I-II.** 399 and 316 pp. Sveriges Mekanforbund, Stockholm, Sweden. (TS200 In8p)

Twenty-eight papers presented at the International Foundry Congress held in Stockholm, August 19-24, 1957.

See also: **9561** (coke size and cupola performance); **9581** (foundry bonding clays from Indiana); **9708** (production of low phosphorus cast iron); **9731** (ferrous foundry practice); **9774** (ferritization of nodular iron); **9846** (formation of nodular graphite in Mg-treated iron); **9848** (inclusions in nodular iron); **9897** (γ-ray inspection of castings).

METALS—HEAT TREATMENT

9771* (Russian.) Increase of Antifriction Properties of Steels by Chlorination. **Povyshenie protivozadirnykh svoistv stalei putem khlorirovaniia.** Iu. M. Vinogradov and N. S. Dombrovskaia. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Tekhnicheskikh Nauk*, 1958, no. 1, Jan., p. 128-130.

Chlorination to reduce friction and wear of machine parts can be done in both gaseous media and in salt baths containing active Cl compounds. A sufficiently high temperature for interaction between Cl and metal is necessary.

9772* (German.) Blank Annealing in Electric Ovens. **Blankglühen mit Elektroöfen.** O. Meyer-Witting. *Elektrowärme*, v. 16, Jan. 1958, p. 4-12.

Shows the importance which electric ovens have acquired in the metalworking industry for blank annealing.

9773* (French.) Production of Uniform Temperatures in Heat Treatment Furnaces. **Obtention de températures homogènes dans les fours de traitement thermique. I.** J. Carrasse. *Flamme et Thermique*, v. 10, no. 113, Feb. 1958, p. 27-33.

Problems; study of two annealing furnaces. Example of a difficult problem. (To be continued.)

9774* A Study of the Ferritization of Nodular Iron. Earl J. Eckel. *Modern Castings*, v. 33, Apr. 1958, p. 85-99.

Nodular irons of two compositions were subjected to slow cooling through eutectoid range, quenching to and holding at temperatures both below and above the critical temperature for isothermal transformation, reheating of pearlitic structures to various temperatures ranging from below to above the critical temperature, or tempering of martensitic structures.

See also: **9725** (vacuum heat treating equipment).

METALS—MECHANICAL AND PHYSICAL PROPERTIES

9775 (English.) **Influence of Microstructure on the Carbon Damping Peak in Iron-Carbon Alloys.** Philip Stark, B. L. Averbach, and Morris Cohen. *Acta Metallurgica*, v. 6, Mar. 1958, p. 149-155.

The internal-friction peak due to the stress-induced migration of C in b.c.c. iron was studied in a series of high-purity Fe-C alloys with variations in grain size and intercarbide distance.

9776 Metal Fatigue. N. Thompson and N. J. Wadsworth. *Advances in Physics*, v. 7, no. 25, Jan. 1958, p. 72-169 + 13 plates.

A review of experimental techniques, results, and current ideas on the interpretation of these results.

9777 (Russian.) The Nature of Non-Uniform Plastic Deformation of Metallic Monocrystals. **O prirode neravnomernosti plasticheskoi deformatsii metallicheskikh monokristallov.** E. D. Shchukin, Iu. V. Goriunov, N. V. Pertsov, and V. N. Rozhanskii. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 2, Jan. 11, 1958, p. 277-279.

9778* (Russian.) Relationships Between Microhardness of Solid-Solution Crystals and Composition of Alloys in Three Component Systems. **O nekotorykh zakonomernostiakh zavisimosti mikrotverdosti kristallov tverdogo rastvora ot sostava splava v trekhkomponentnykh sistemakh.** N. N. Glagoleva and V. M. Glazov. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Tekhnicheskikh Nauk*, 1958, no. 1, Jan., p. 130-134.

Investigation of relationships in the Al-Mg-Si, Al-Cu-Mg, and Cu-Zn-Sn systems.

9779* (Russian.) Dependence of Ductility of Germanium on Temperature. **Issledovanie temperaturnoi zavisimosti viazkosti germaniia.** V. M. Glazov and D. A. Petrov. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Tekhnicheskikh Nauk*, 1958, no. 2, Feb., p. 15-19.

9780* (Russian.) Effect of Micro Non-Homogeneity of Alloys on Their Behavior at High Temperatures. **Vliianie mikroneodnorodnosti splavov na ikh povedenie pri povyshennykh temperaturakh.** M. E. Drits, E. S. Kadaner, and Z. A. Sviderskaia. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Tekhnicheskikh Nauk*, 1958, no. 2, Feb., p. 139-142.

Using radioactive tracers, a Mg alloy of the Mg-Mn-Al-Ca system was studied with respect to the effect of the Ca content on its heat resistance and ductility.

9781 New Method of Increasing the Wear Resistance of Tracks With Open Bushings. A. A. Maurakh. *Henry Brutcher Translation No.* 3962, 6 pp. (From *Vestnik Mashinostroeniia*, v. 36, no. 12, 1956, p. 16-18.) Henry Brutcher, Altadena, Calif.

Merits of boronizing in imparting maximum wear resistance to carbon structural steel. Excessive abrasive wear of pinbores as a major problem with track links of cast austenitic Mn steel. An electrolytic boronizing method.

9782 Study of Zone of Failure in Creep. I. L. Mirkin and I. I. Trunin. *Henry Brutcher Translation No.* 3979, 10 pp. (From *Metallovedenie i Obrabotka Metallov*, no. 6, June 1957, p. 2-7.) Henry Brutcher, Altadena, Calif.

The microhardness of steel close to a crack produced by creep testing is lower than in the bulk "sound" metal. The decrease in hardness occurs in a band about 0.004 in. wide around the crack; in this region hardness was as much as 12-14% less that of "sound" metal at a distance from the crack.

9783 Discussion of Temper Brittleness, a Summation. I. V. D. Sadovskii. *Henry Brutcher Translation No.* 3980, 18 pp. (From *Metallovedenie i Obrabotka Metallov*, no. 6, June 1957, p. 24-31.) Henry Brutcher, Altadena, Calif.

Summarizes discussions on reversible temper brittleness, consisting in a lowering of the impact value of certain structural steels after different tempering schedules.

9784 Influence of Impurities on the Properties of High-Temperature Strength Nickel-Chromium Alloys. M. V. Pridantsev and G. V. Estulin. *Henry Brutcher Translation No.* 4088, 10 pp. (From *Stal'*, v. 17, no. 7, 1957, p. 636-640.) Henry Brutcher, Altadena, Calif.

The most harmful impurities are Pb, Sb, and other elements having low melting points and very low solubilities in solid solution. Workability is impaired by more than a certain critical amount of S, C, Si, and Mn.

9785* Fatigue Life of Metallic Materials Under Varying Repeated Stresses of Two Different Stress Waves. Toshio Nishihara and Toshiro Yamada. *Bulletin of JSME*, v. 1, no. 1, Jan. 1958, p. 1-6.

Data indicate that fatigue failure is caused by both the first and second stress waves for the soft materials tested (low carbon steel and super duralumin), but only by the first stress wave for the harder high carbon steel.

9786 Consistent Results in Hardness Testing. R. S. Marriner and F. C. P. Mason. *Engineering*, v. 185, Mar. 14, 1958, p. 339-340.

New standard indenting machine has loads in the form of dead weights freely suspended from the indenter. Machine is completely enclosed in a case of hexagonal shape surmounted by Perspex windows and is operated by controls housed in a separate cabinet.

9787* Flash-Welded Line Pipe. II. Brittle Fracture in Steel as Related to Flash-Welded Line Pipe. III. Low-Temperature Burst Tests of Flash-Welded Line Pipe. M. A. Scheil, G. E. Fratcher, S. L. Henry, and E. H. Uecker. *Engineering Journal*, v. 41, Mar. 1958, p. 59-71.

9788* (Italian.) Influence of the Matrix and of the Graphite. **Influenza della matrice e della grafite.** *Fonderia*, v. 7, Jan. 1958, p. 21-29.

Principal mechanical properties of unalloyed gray cast iron and a study of their variation as a function of structural and fabrication factors. Density, elasticity modulus, hardness, tensile resistance, chemical composition, and tapping temperature were considered.

9789* (Russian.) Investigation of the Process of Magnetization and Demagnetization of Ferrosilicon. **Issledovanie protsessa namagnichivaniia i razmagnichivaniia magnetita i ferrosilitsiia.** V. G. Derkach and T. N. Galevskaia. *Gornyi Zhurnal*, 1958, no. 2, Feb., p. 53-56.

During the magnetization in a 1000 oersted field, the coercive force of magnetite 0-0.1 mm. thick is 42-68 oersteds; the residual magnetism is 12.5 to 19.6 gauss. The coercive force of ferrosilicon is about 19 oersteds and the residual magnetism 5 to 6 gauss.

9790* (Czech.) Evaluation of Ductility of Vacuum Cast Steels. **Zhodnocení tvárnosti ocelí litých do vakua.** Vladimir Hašek. *Hutnické Listy*, v. 13, no. 3, Mar. 1958, p. 221-226.

Examination of the ductility of ordinary steels, those cast under vacuum, or exposed to vacuum during and after casting. The latter steel, due to its fine grained structure in the cast state, has better ductility even at a higher degree of forging, than steel cast in the usual way.

9791* (Czech.) Selection of Chemical Composition of Steel for Manufacturing Series D Drill Pipes. **Volba chemického Složení oceli pro vrtné trubky stupně D.** Roman Šejnoha. *Hutník (Czech)*, v. 8, no. 3, Mar. 1958, p. 78-85.

Mechanical properties of standard pipes. Variation in values of mechanical properties and causes. Effect of basic elements of carbon steel on yield and tensile strengths and reduction of area of the pipe material.

9792 Constitutional Factors Affecting the Tensile Properties of Wrought Aluminium-Magnesium-Silicon-Copper Alloys. D. L. W. Collins. *Institute of Metals, Journal*, v. 86, Mar. 1958, p. 325-336.

A close correlation was found between mechanical properties and constitution.

9793 A Simple Tensile Testing Machine for Very Fine Wires. A. E. Widdowson. *Journal of Scientific Instruments*, v. 35, no. 3, Mar. 1958, p. 100-101.

A simple machine by which stress/strain curves can be obtained for W wires as fine as 5 μ in diameter.

9794* (Russian.) Effect of Hardening on the Mechanical Properties of Carbon Steels. **Vliianie naklepa na mekhanicheskie svoistva uglerodistykh stalei.** I. V. Kudriavtsev, T. V. Naumova, and L. M. Rozenman. *Metallovedenie i Obrabotka Metallov*, 1958, no. 3, Mar., p. 2-6.

Hardness, yield strength, plasticity, resilience, and fatigue strength at 600 and 800 C were studied.

9795* (Russian.) Cyclic Strength of Austenitic Steels Under High Temperature Gas Corrosion. **Tsiklicheskaia prochnost' austenitnykh stalei v usloviiakh vysokotemperaturnoi gazovoi korrozii.** A. V. Riabchenkov and E. L. Kazimirovskaia. *Metallovedenie i Obrabotka Metallov*, 1958, no. 3, Mar., p. 6-10.

Changes in strength in atmospheric air with 0.3 to 5% SO_2 content and various amounts of moisture were investigated.

9796 The Strain Hardening Behaviour of High Purity Copper. An Appraisal of Tests by Carreker and Hibbard. E. Voce. *Metallurgia*, v. 57, Mar. 1958, p. 111-116.

9797 Unloading Effects in the Plastic Properties of Copper Single Crystals. M. J. Makin. *Philosophical Magazine*, v. 3, no. 27, Mar. 1958, p. 287-301.

Unloading tests at constant temperature; annealing between unloading and retesting; retesting at a different temperature from unloading.

9798* (English.) **The Crystallographic Aspect of the Mechanical Twinning in Ti and α-U.** Hiroshi Kiho. *Physical Society of Japan, Journal*, v. 13, Mar. 1958, p. 269-272.

9799* (English.) **Statistical Aspects in Accelerating Creep and Creep Fracture of OFHC Copper.** Takeo Yokobori and Hideharu Ohara. *Physical Society of Japan, Journal*, v. 13, Mar. 1958, p. 305-312.

Results of creep fracture tests on OFHC Cu wire at 24-25 kg./mm.^{2} and 8-40 C were statistically analyzed.

9800 Physical Properties of Certain Liquid Binary Alloys of Tin and Zinc. T. C. Toye and E. R. Jones. *Physical Society, Proceedings*, v. 71, Jan. 1958, p. 88-99.

Measurements of viscosity, density, and electric resistance of Zn-Al, Zn-Pb, Zn-Sn, Sn-Zn, Sn-Ag, Sn-Cu, Sn-Ni, and Sn-Pb systems.

9801 Heat Capacity Between 1·8 and 4·2°K of an Iron-Chromium Alloy in the Alpha and Sigma Phases. F. E. Hoare and J. C. Matthews. *Physical Society, Proceedings*, v. 71, Feb. 1958, p. 220-224.

The alloy contained 44.1 at.% Cr, where the pure σ-phase may be precipitated by prolonged annealing.

9802* High-Temperature Creep of Metals. J. Weertman. *Report of NRL Progress*, Feb. 1958, p. 15-20.

At low stresses the steady-state creep rate obeys a power-law stress dependence. This dependence can be explained in terms of a dislocation creep model.

9803 Hydrogen, Crack Initiation, and Delayed Failure in Steel. H. H. Johnson, J. G. Morlet, and A. R. Troiana. *U. S. Air Force. Wright Air Development Center. WADC Technical Report* 57-262, May 1957, 44 pp. (TL507 Un3.18w Vis.)

Crack initiation and propagation are controlled by an interaction between H concentration and triaxial stress state. The incubation period for crack initiation is interpreted as the time required for diffusion of a critical amount of H.

9804 Fatigue Crack Propagation in Severely Notched Bars. W. S. Hyler, E. D. Abraham, and H. J. Grover. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3685, June 1956, 31 pp. (TL570 Un3t Vis.)

Fatigue tests were made in rotating bending on severely notched bars machined from 2024-T4 aluminum-alloy extruded round rods. Fatigue cracks initiated early in the lifetime of the severely notched specimens. Cracks in large-diameter specimens had a period of rapid crack growth followed by a marked tapering off in rate of crack propagation. This may be associated with compressive residual stresses.

9805 Measurements of Total Hemispherical Emissivity of Various Oxidized Metals at High Temperature. William R. Wade. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4206, Mar. 1958, 42 pp. (TL570 Un3t Vis.)

Measurements on stainless steel (AISI 303), mild steel (AISI C1020), Ti (TMCA Ti-75A), Ti alloy (RS-120), Cu, Al, (AA 3003), Mo, and Ta between 600 and 2000 F.

9806 Effect of Overheating on Creep-Rupture Properties of M-252 Alloy. John P. Rowe and J. W. Freeman. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4224, Mar. 1958, 83 pp. (TL570 Un3t Vis.)

The effects of overheats to 1650, 1800, 1900, and 2000 F were evaluated in terms of the changes in creep-rupture properties at 1500 F of M-252 alloy under stresses within the range of rupture strengths of the alloy for 80 to 1000 hrs.

9807* (Russian.) Brittleness of Steel Caused by the Process of Investigation, and Method of Detection. **Khrupkost' stali, vyzvannaia protsessom ispytaniia i metodika ee vyiavleniia.** K. M. Pogodina-Alekseeva and G. I. Pogodin-Alekseev. *Zavodskaia Laboratoriia*, v. 24, no. 2, 1958, p. 198-201.

Method for determining the factors causing brittleness other than that characteristic of the initial metal.

9808* (Russian.) Effect of Molecular Adsorption on the Work Function and Conductivity of Germanium. **Vliianie adsorbtsii molekul na rabotu vykhoda i provodimost' germaniia. I-II.** V. I. Liashenko and V. G. Litovchenko. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 3, Mar. 1958, p. 447-459.

9809* (Russian.) Effect of a Strong Electric Field (10^6 v/cm) on Evaporation and Resistance of Mo, Ta, and W Metal. **K voprosu o vliianii sil'nogo elektricheskogo polia (10^6 v/cm) na isparenie i soprotivlenie metallov (Mo,Ta,W).** N. A. Gorbatyi and G. N. Shuppe. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 3, Mar. 1958, p. 623-635.

See also: **9702** (fretting corrosion and fatigue failure); **9735** (properties of transformer steel); **9753** (properties of meehanite); **9854** (mechanical properties of Cr steels); **9858** (deformation of Cr-Ni-Mo steel); **9908** (spin disorders in resistivity of metals and alloys); **10039** (damage from liquid supersonic impact); **10257** (properties of welds).

METALS—MECHANICAL WORKING

9810 Experimental Measurement of Metal-Cutting Temperature Distributions. G. S. Reichenbach. *ASME, Transactions*, v. 80, no. 3, Apr. 1958, p. 525-540.

Two new methods of measuring cutting temperatures have been evaluated. The first is a radiation technique using a lead-sulfide cell. The second uses a 0.005-in. single wire imbedded in the side of a work-piece as a thermocouple.

9811* The Influence of Micro-Structure on the Machinability of a Medium Carbon Steel. A. Gibson. *Australasian Engineer*, 1958, Feb. 7, p. 56-60.

Optimum structure for good machinability consists of a pearlite-ferrite structure with the pearlite a composite of lamella and spheroids for maximum tool-life with moderate cutting force requirements and is obtainable by suitable heat treatment.

9812* Ceramic Tool Geometry. II. Rake, Land Dimension and Relief Angle Determine Tool Life. H. D. Moore and D. R. Kibbey. *Automatic Machining*, v. 19, no. 6, Apr. 1958, p. 42-45.

Early fracture of ceramic tools bits can be charged at least in part to thermal or mechanical shock involved in the starting or stopping of the cut. A chiping factor, based on the number of successful starts a tool might make has been developed as a measure of tool life. Using the chipping factor as a measure, six tests were run using 190 different cutting edges to determine the importance of other factors. In all cases, an increase in the nose radius resulted in less chipping.

9813 Phosphate and Waterglass Coating of Wire for Drawing. I. M. Goncharov, L. I. Fudim, F. M. Ladyzhenskaya, and O. A. Ryabchikova. *Henry Brutcher Translation No.* 4076, 10 pp. (From *Stal'*, v. 17, no. 5, 1957, p. 464-465.) Henry Brutcher, Altadena, Calif.

Comparison of waterglass and phosphate coatings. Use of waterglass gave improved die life, greater drawing throughout, better plant conditions, and eliminated need for coppering; however the wire responds poorly to hot-dip galvanizing and wet drawing.

9814 Study of Oils and Emulsions for Lubrication in Cold-Rolling Trials. I. Lubricants Made up of Pure Basis Oils or Fats and Additives. W. Lueg, P. Funke, and W. Dahl. *Henry Brutcher Translation No.* 4100, 37 pp. (From *Stahl und Eisen*, v. 77, no. 25, 1957, p. 1817-1830.) Henry Brutcher, Altadena, Calif.

Study of relationship between lubricant composition, physical properties, and consistency, on the one hand, and lubricity and performance in cold rolling, on the other.

9815 Grinding of Hard Metals With Electrically Conducting Abrasives, Using Graphite as a Filler. I. K. Trushin. *Henry Brutcher Translation No.* 4105, 6 pp. (From *Vestnik Mashinostroeniia*, v. 37, no. 5, 1957, p. 59-61.) Henry Brutcher, Altadena, Calif.

Describes a method of getting a high quality finish on hard metals with electrically conducting abrasives and d.c. applied to the area of machining and using a special working liquid. "Electroabrasive finishing" is an improved form of fine electrolytic grinding, in which the electroabrasive is simultaneously a cathode and a tool which removes the anode film of hard-metal disintegration products.

9816 (English.) **Study on the Testing Method of Cemented Carbide-Tools. (On the Critical Value of Flank Wear).** Keiji Okushima, Shukichi Nagatomi, and Kitao Okusa. *Bulletin of JSME*, v. 1, no. 1, Jan. 1958, p. 79-85.

The critical value of flank wear depends on the carbide grade, material cut, cutting condition, and the type of tool failure. Presents a table of proposed critical flank wear values for various tools, cutting conditions, and materials.

9817* 1st Step to Carbide Die Success: Good Design. Robert C. Nutting. *Carbide Engineering*, v. 10, Apr. 1958, p. 9-13.

Carbide dies should be designed so they can be reassembled to original alignments. A die that is slightly misaligned will wear excessively and will probably chip, requiring more frequent stoppages for repairs and for more frequent resharpening. Most satisfactory operation for the carbide die is obtained with the four post high precision die set.

9818* Throwaway Tooling: Is It the Answer? Albert P. Goeppert. *Carbide Engineering*, v. 10, Apr. 1958, p. 14-17.

Use of carbide inserts eliminates costly grinding operations. Heat is distributed more evenly over the entire tip with the result there is less likelihood of thermal cracks than in conventional tools. The cost per cutting edge of the throwaway inserts is extremely low. Because of the double negative rake tool geometry, both the top and bottom of the insert can be utilized.

9819* (Polish.) Automatic Loop Drive in a Continuous Hot Rolling Mill. **Automatyczne petlownice na goracych walcowniach ciaglych.** Ryszard Hagel and Joachim Jońca. *Hutnik*, v. 24, no. 12, Dec. 1957, p. 488-494.

Variations of electrical, mechanical, and technical parameters. Design, calculation, and regulation of the loop size. Motion tests.

9820 Titanium Extrusions Cut Production Costs. N. J. Feola. *Iron Age*, v. 181, no. 13, Mar. 27, 1958, p. 96-98.

Extrusion techniques plus the use of cast Ti ingots provide a two-way cost reduction program for Ti parts of top quality.

9821 Tips on Spinning Stainless Parts. *Iron Age*, v. 181, no. 14, Apr. 3, 1958, p. 101-103.

9822 Turn-Up and Turn-Down in Hot Rolling. G. E. Kennedy and F. Slamar. *Iron and Steel Engineer*, v. 35, Mar. 1958, p. 71-79.

Simple hot mill passes studied on laboratory mills indicate that the most significant factors which affect the amount of

turn-up and turn-down is the surface-speed ratio of the top and bottom rolls.

9823* (English.) **Machinability of Metals.** Hidehiko Takeyama and Eiji Usui. *Journal of Mechanical Laboratory of Japan*, v. 3, no. 2, 1957, p. 81-86.

A study of the relationship between the physical properties of a metal and its machinability in terms of chip formation.

9824* Mechanizing Drill Press Set-Ups With Pneumatic Controls. Ben Eldridge and J. L. Fisher, Jr. *Machine and Tool Blue Book*, v. 53, Apr. 1958, p. 120 + 4 pages.

Laborious drilling work can be made semi-automatic or automatic and individual operations may be combined by equipping standard drill presses and drill press heads with pneumatic controls for spindle feed, indexing, positioning, and clamping the work.

9825 Rotary Extrusion Reduces Costs and Saves Material. J. Genis and W. Mallindine. *Machinery*, v. 64, no. 8, Apr. 1958, p. 115-121.

Substantial material savings and cost reductions are being realized in the production of various jet-engine components by the cold power spinning, or power roll-forming method.

9826 Paper-Thin Steel Sheet Cuts Weight of Aircraft. *Materials in Design Engineering*, v. 47, Apr. 1958, p. 128-133.

Lighter, yet stronger aircraft structures are made from thin steel foil, on the order of 0.001 to 0.005-in. thick.

9827* (Dutch.) Wear Phenomena in Tools Used for Metal Working. **Slijtageverschijnselen aan gereedschappen voor de verspanende bewerking.** J. L. Remmerswaal. *Metalen*, v. 13, no. 6, Mar. 31, 1958, p. 106-110.

Heat developed by the splitting, rubbing, and deforming processes. Chisel materials. Wear measurements. Ratio between wear and time of use for different materials.

9828* (German.) Machines and Examples of Metal-Working by Electro-Erosion. **Maschinen und Arbeitsbeispiele zur Metallbearbeitung durch Elektro-Erosion.** F. W. Simonis. *Metall*, v. 12, no. 4, Apr. 1958, p. 262-268.

Automation of electrode movement. Comparison of the surface finish obtained by normal methods and by electro-machining. Various machines used with this method.

9829* (German.) Automation of Machining Techniques. **Automatisierung in der Zerspanungstechnik.** K. W. Michler. *Metall*, v. 12, no. 4, Apr. 1958, p. 287-293.

A description of different automatic metal-cutting machines providing higher performance, short idle time, easy operation, better chip flow, and longer life.

9830 Concentrated Wear of Turning Tools. V. Solaja. *Research*, v. 11, Apr. 1958, p. 152-156.

Under some circumstances, concentrated wear in the form of sharply defined grooves occurs on the wear land of the clearance face of cutting tools. This grooving affects the roughness obtained in finish turning of steel with high-speed-steel and carbide tools since surface finish depends on the manner in which the tool wears, and not simply on the absolute value of maximum width of the wear-land. In finish turning of Al or Cu alloys and of cast iron, these grooves are not formed, and consequently do not affect the surface finish.

9831* (German.) Examination of Rolling Oils and Oil Emulsions by the Cold Rolling Test. **Untersuchung von Walzölen und Walzölemulsionen im Kaltwalzversuch. II.** Rolling Tests With Commercial Rolling Oils Under Different Conditions of Operation Adapted to Practice. **Walzversuche mit handelsüblichen Walzölen unter verschiedenen dem Betrieb angepassten Arbeitsbedingungen.** Werner Lueg and Paul Funke. *Stahl und Eisen*, v. 78, no. 6, Mar. 20, 1958, p. 333-343.

9832* (German.) Investigations on the Characteristics and Behavior in Service of Novel Rolling Oil Emulsions. **Untersuchungen über Eigenschaften und Betriebsverhalten neuer Walzölemulsionen.** Joseph Billigmann and Walter Fichtl. *Stahl und Eisen*, v. 78, no. 6, Mar. 20, 1958, p. 344-357.

Characterization of the lubricating effect by the thickness of strip obtained in the rolling test. Influence of the lubricant composition, additions, water hardness, and concentration of the emulsion on the lubricating power.

9833* (German.) Investigations on the Effect of Rolling Conditions on Properties of Hot-Rolled Low Carbon Steel Strip. **Über den Einfluss der Walzbedingungen auf die Eigenschaften von kohlenstoffarmem Warmband. I.** Structure of the Scale and Behavior in Pickling. **Zunderaufbau und Beizverhalten.** Winfrid Dahl and Werner Lueg. *Stahl und Eisen*, v. 78, no. 6, Mar. 20, 1958, p. 368-377.

9834* (Russian.) Status of the Development of Ceramic Cutting Tools. **Sostoianie razvitiia mineralokeramiki pri obrabotke metallov rezanien.** V. Ia. Rassokhin and M. A. Rura. *Stanki i Instrument*, v. 29, no. 2, Feb. 1958, p. 12-14.

High hardness, wear resistance, and red-hot hardness (1100-1200 C) of ceramic tools permit high-speed machining of high alloyed and hardened steels widely used nowadays. Basically the ceramic tools are used for finishing and semifinishing of steel, cast iron, and non-ferrous metals. One advantage of ceramics vs. hard alloys and special tool steels is their lesser tendency to stick to the machined material, which is very important when machining heat-resistant steels and alloys.

9835* (Russian.) Production of Cutting Tools From Chips of High-Speed Steel. **Izgotovlenie reztsov iz struzhki bystrorezhushchei stali.** Iu. P. Zimin and K. M. Stroeva. *Stanki i Instrument*, v. 29, no. 2, Feb. 1958, p. 15.

Experiments to prove the possibility of utilizing high-speed steel chips for manufacturing cutting tips. Recommends a forge-welding method. Chips should be heated up to 1100-1150 C and then intensively forged. Heat treatment of these tips is identical with that of standard forged steel. Cutting properties of tools from steel chips and tools from standard-type steels P9 and P18 are nearly the same.

9836* The Application and Maintenance of Carbide Twist Drills. Frank W. Curtis. *Tooling & Production*, v. 24, no. 1, Apr. 1958, p. 75-79.

Carbide twist drills are to be used only for drilling cast and malleable iron, non-ferrous metals such as Al, Mg, die castings, and Cu and brass alloys, and for non-metallic materials, such as plastics, hard rubber, fiber, and similar products.

9837* (French.) Wear of Electrical Contacts During Machining by Electro-Erosion. **De l'usure des contacts électriques à l'usinage par électro-érosion.** M. M. Marc Bruma and Jacques Roncin. *Wear*, v. 1, no. 4, Feb. 1958, p. 305-316.

Discusses the electro-erosion phenomenon and variables influencing it. Determining optimum conditions for industrial application of the process.

See also: **9418** (digital systems for automatic machine tools); **9419** (actuation for linear positioning); **9887** (life of WC tools); **9902** (automatic rolling mill control); **10261** (bonding carbide tips to tool holders).

METALS—METALLOGRAPHY, TRANSFORMATIONS, AND STRUCTURES

9838* (Portuguese.) Austenitic Transformations; Mechanism of Perlite and Bainite Formation. **Transformações da austenita; mecanismo da formação da perlita e da bainita.** Michiyasu Doi and Kenkichi Fujimori. *ABM (Boletim da Associaçao Brasileira de Metais)*, v. 14, no. 50, Jan. 1958, p. 111-138.

Mechanism of perlite and bainite formation in carbon steel on the basis of a metastable Fe-C equilibrium diagram. Difference in the formation of primary and secondary bainite was explained mainly by the mobility of the C atoms with the temperature of transformation.

9839 Factors Affecting the Alpha-Beta Phase Boundaries of Zirconium and Titanium Alloys. J. O. Betterton, Jr. and J. H. Frye, Jr. *Acta Metallurgica*, v. 6, Mar. 1958, p. 205-211.

Variation of the phase boundaries, arising from the allotropic transition in Zr and Ti, can be reduced to an approximate common behavior in terms of electron concentration if a metallic valency of 2 is used, and if allowance is made for energy effects due to unequal sizes of atoms.

9840 (Russian.) Effect of Chromium, Molybdenum, and Tungsten on the Self-Diffusion of Iron in Dilute α-Solid Solutions. **Vliianiia khroma, molibdena i vol'frama na samodiffuziiu zheleza v razbavlennykh α-tverdykh rastvorakh.** I. B. Borovskii, K. P. Gurov, and Iu. G. Miller. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 2, Jan. 11, 1958, p. 280-283.

9841* (Russian.) Diffusion in Alloys of the System Nickel-Chromium-Titanium. **Issledovanie diffuzii v splavakh sistemy nikel'-khrom-titan.** A. Ia. Shiniaev. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Tekhnicheskikh Nauk*, 1958, no. 2, Feb., p. 143-145.

Effect of Ti content on diffusion of Fe 59 tracers.

9842* (Russian.) The Growth and Joining of Crystals Under the Effect of Ionizing Radiation. **Rost i srashchivanie kristallov pod vliianiem ioniziruiushchikh izluchenii.** M. L. Baskin and A. A. Semerchan. *Akademiia Nauk SSSR, Vestnik*, v. 28, no. 1, Jan. 1958, p. 69-70.

9843* (English.) **Experimental Studies on Grain Growth in Metals.** H. U. Åström. *Arkiv för Fysik*, v. 13, no. 1, 1958, p. 69-80.

Combined calorimetric and microscopic methods gave the average specific energy of the large-angle boundaries in pure Ag, Al, and Zn. The energy of activation for grain-growth was calculated from the microscopically determined rate of change of the boundary area for a fixed grain size at different temperatures.

9844* (Russian.) Study of the Zirconium Area in the Zr-Ta-Nb Constitution Diagram. **Issledovanie tsirkonievogo ugla fazovoi diagrammy sostoianiia Zr-Ta-Nb.** V. S. Emel'ianov, Iu. G. Godin, and A. I. Evstivkhin. *Atomnaia Energiia*, v. 4, no. 2, Feb. 1958, p. 161-168.

Study of compositions up to 82% Zr at 1200 C by metallographic and thermal analysis and by measuring electrical resistivity.

9845 Metallographic Study of the Carbides in High-Speed Steels. M. S. Chaadaeva. *Henry Brutcher Translation No.* 4065, 3 pp. (From *Zavodskaia Laboratoriia*, v. 23, no. 7, 1957, p. 811-813.) Henry Brutcher, Altadena, Calif.

Differential etching technique for determining nature and approximate proportions of the various types of carbides in HS steel.

9846 Solubility of Magnesium in Cast Iron. A. F. Landa. *Henry Brutcher Translation No.* 4070, 11 pp. (From *Liteinoe Proizvodstvo*, no. 8, Aug. 1957, p. 27-29.) Henry Brutcher, Altadena, Calif.

Theories about the mechanism of formation of spheroidal graphite in Mg-treated cast iron. Experimental proofs that Mg is able to dissolve in iron and diffuse through it to the graphite.

9847 Behavior of Hydrogen in Iron (Steel). A. Smialowski. *Henry Brutcher Translation No.* 4082, 17 pp. (From *Neue Hütte*, v. 2, no. 10, 1957, p. 621-626.) Henry Brutcher, Altadena, Calif.

Expansion due to penetration of H into Fe; associated calculations. Diffusion coefficient of H in Fe at room temperature; probable effect of "blowhole layer" on observed values. Nature of H in the Fe lattice.

9848 Nonmetallic Inclusions in Spheroidal Graphite Cast Iron. P. P. Arsent'ev and Iu. Ia. Orlova. *Henry Brutcher Translation No.* 4096, 8 pp. (From *Liteinoe Prozvodstvo*, no. 4, Apr. 1957, p. 23-24.) Henry Brutcher, Altadena, Calif.

Study of minearalogy of inclusions, including Mg compounds, and of the conditions under which they are formed. Procedure used for identification of minerals in oxide inclusions.

9849 Effect of Ultrasonic Vibration on the Structures of Eutectic Alloys. V. V. Zboleev-Zotov and G. I. Pogodin-Alekseev. *Henry Brutcher Translation No.* 4106, 11 pp. (From *Metallovedenie i Obrabotka Metallov*, no. 1, Jan. 1958, p. 2-6.) Henry Brutcher, Altadena, Calif.

Ultrasonic power level, alloy composition, and cooling rate were the variables studied in the Pb-Sb, Zn-Sn, Al-Si, and Al-Sn systems.

9850 X-Ray Study of the System Vanadium Carbide (VC)-Tungsten Carbide (WC). M. A. Gurevich and B. F. Ormont. *Henry Brutcher Translation No.* 4107, 8 pp. (From *Metallovedenie i Obrabotka Metallov*, no. 1, Jan. 1958, p. 7-10.) Henry Brutcher, Altadena, Calif.

At 1700-1800 C (3090-3270 F) cubic VC dissolves about 10-mole % of hexagonal WC. At 2150-2200 C (3900-3980 F) VC dissolves more than 50 mole % of WC and can form a continuous series of solid solutions with a continuous change in lattice parameter from 4.16 to 4.21, the rate of change with WC content being very sharp. The *c* parameter for WC decreases by 3-4 units in the third decimal place (*a* remains unchanged) from its value in pure WC, probably because of the very small solubility of cubic VC in hexagonal WC.

9851 Phase Diagram of Chromium-Niobium System. V. N. Eremenko, G. V. Zudilova, and L. A. Gaevskaya. *Henry Brutcher Translation No.* 4108, 10 pp. (From *Metallovedenie i Obrabotka Metallov*, Jan. 1958, no. 1, p. 11-16.) Henry Brutcher, Altadena, Calif.

Specimens, prepared both by melting and by sintering of powder compacts, were studied by thermal analysis, metallography, X-ray diffraction, and microhardness measurements. Only one intermetallic compound $NbCr_2$ was found, with a face-centered cubic lattice. This intermetallic compound forms a eutectic with a Nb-base solid solution with 66 weight-% Nb, melting at 1710 C (3110 F) and with the Cr-base solid solution, one containing approximately 31% Nb, and melting at 1660 C (3020 F).

9852* (French.) Method of Preparing Pure Aluminum Bicrystals With Predetermined Orientations. **Méthode de préparation de bicristaux d'aluminium pur d'orientations déterminées à l'avance.** Claude Goux and Jean Montuelle. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 11, Mar. 17, 1958, p. 1691-1693.

Two single crystal nuclei suitably oriented were welded onto a polycrystalline plate. The relative orientations of the nuclei were imparted to the plate by progressive fusion and crystallization.

9853 Equilibria in the Niobium-Hydrogen System. W. M. Albrecht, M. W. Mallett, and W. D. Goode. *Electrochemical Society, Journal*, v. 105, Apr. 1958, p. 219-223.

The Nb-H system was investigated in the range 100-900 C, 10-1000 mm. Hg, and H/Nb ratios of 0.01-0.85. The absorption of H resulted in the formation of a single-phase solid solution throughout most of the system. However, at about 300 C and a pressure of 8 mm. Hg, the pressence of a two-phase region was indicated between H/Nb ratios of 0.21-0.42. At low H compositions the equilibrium solubility follows approximately a square root of pressure relationship.

9854* (Czech.) Structural Stability of 12% Cr Steels Alloyed With W, Mo, and V. **Strukturní stabilita ocelí 12% Cr-W-Mo-V.** J. Koutský, J. Neid, and J. Ježek. *Hutnické Listy*, v. 13, no. 3, Mar. 1958, p. 199-206.

Thermochemical analysis of carbide precipitation from martensite and δ-ferrite. Effect of tempering and working temperatures on changes of the microstructure and mechanical properties. Effect of holding time on changes of hardness and impact resistance at various temperatures.

9855* (Czech.) Contribution to the Study of Carbide Reactions in Molybdenum Steels. **Příspěvek ke studiu karbidických reakcí v molybdenových ocelích.** Josef Čadek, Bernard Fleischer, and Karel Mazanec. *Hutnické Listy*, v. 13, no. 3, Mar. 1958, p. 206-212.

Crystallographic and chemical characteristics of Mo carbides. Carbide phases in products of martensite tempering at 650 C and in products of isothermic decomposition of austenite annealed at the same temperature for various times up to 5000 hrs.

9856* (Czech.) A Simple Extraction Replica for the Study of Fine-Grained Phases. **Jednoduchá extrakční replika pro studium jemnozrnných fází.** Jaroslav Ježek. *Hutnické Listy*, v. 13, no. 3, Mar. 1958, p. 213-220.

Development of a method using a simplified extraction replica in which a second etching is not used. The replica is neither spoiled by the etching agent nor contaminated with its products, and therefore the choice of the etching process is not limited by the replica material. The replica is a suitable object for either electron microscope or diffractograph.

9857* (Czech.) Phase Analysis of Resistance Welded Joints of Carbon and Low-Alloy Carbon Steels. **Fázový rozbor**

spojov uhlíkatých nelegovaných a nízkolegovaných ocelí, získaných odporovým zvarováním. Dáša Hrivňák and Ivan Hrivňák. *Hutnické Listy*, v. 13, no. 3, Mar. 1958, p. 233-241.

9858* (Polish.) The Effect of Hot Plastic Deformation on the Isothermal Transformation of Austenite in Cr-Ni-Mo Structural Steel. **Wpływ przeróbki plastycznej na gorąco na izotermiczne przemiany austenitu stali konstrukcyjnej Cr-Ni-Mo.** Tadeusz Malkiewicz. *Hutnik*, v. 24, no. 11, Nov. 1957, p. 427-436.

The effect of deformation was explained by three factors: grain coarseness as a result of heating up to 1250 C, change in shape, and the recrystallization of austenite requiring more time when temperature of plastic transformation is lower.

9859* (Polish.) Effect of Steel Microstructure on the Damping of Ultrasonic Waves. **Wpływ mikrostruktury stali na tłumienie fal ultradźwiękowych.** Wacław Rozański and Stanisław Madej. *Hutnik*, v. 24, no. 11, Nov. 1957, p. 452-457.

Investigation of the damping of ultrasonic waves in annealed carbon steel. Application of the damping effect to determination of grain size.

9860 A Note on Aluminium-Rich Aluminium-Manganese-Copper-Nickel Alloys. G. V. Raynor and C. R. Faulkner. *Institute of Metals, Journal*, v. 86, Mar. 1958, p. 323-324.

Metallographic examination indicates that the ternary compounds $Ni_4Mn_{11}Al_{85}$ and $Cu_2Mn_3Al_{20}$ form a complete series of solid solutions in this quaternary system.

9861 Field Emission From Mercury Whiskers. Robert Gomer. *Journal of Chemical Physics*, v. 28, Mar. 1958, p. 457-464.

A method for growing metal whiskers in a modified field emission tube was developed and applied to Hg. Emission patterns from whiskers show these to be 110 oriented single crystals when grown on a W substrate.

9862* (Russian.) Composition and Structure of Decarbonized and Transitional Zones in Annealed Cast Irons. **Sostav i stroenie obezuglerozhennoi i perekhodnoi zon v otozhzhennykh chugunakh.** K. I. Vashchenko and N. A. Golovan'. *Liteinoe Proizvodstvo*, 1958, no. 3, Mar., p. 16-20.

Study of diffusion processes during formation of crystalline structure in the decarbonized zone, and carbides in the transitional zone which provoke cracks and ruptures during extrusion.

9863* (Russian.) Carbide Transformations in Low Temperature Decomposition of Undercooled Austenite. **Karbidyne prevrashcheniia pri nizkotemperaturnom raspade pereokhlazhdennogo austenita.** V. G. Permiakov. *Metallovedenie i Obrabotka Metallov*, 1958, no. 3, Mar., p. 24-29 + 2 plates.

Investigating carbide phases in carbide and alloyed steels.

9864 The Metallographic Application of X-Ray Scanning Microanalysis. D. A. Melford and P. Duncumb. *Metallurgia*, v. 57, Mar. 1958, p. 159-161.

A scanning version of the Castaing technique for determining the composition of a minute area on a metal surface by irradiating it with a fine-focus electron beam and analyzing the resultant X-ray emission.

9865 Remote Metallography Practices at Battelle's Hot-Cell Facility. A. W. Hare, A. A. Bauer, and R. F. Dickerson. Paper from "1958 Nuclear Congress, Sixth Hot Laboratories and Equipment Conference, March 19-21, 1958". p. 232-236. 1958. American Institute of Chemical Engineers, New York. (QC799 H79 Over.)

Techniques and equipment for preparing radioactive metallographic specimens are described and some results illustrated. Efficiency may be greatly increased by the use of vibratory grinding and polishing machines.

9866 On the Origin of Dislocations. Doris Kuhlmann-Wilsdorf. *Philosophical Magazine*, v. 3, no. 26, Feb. 1958, p. 125-139.

In the face-centered cubic lattice a stacking fault, caused by the condensation of vacancies on a $\{111\}$ plane, is converted into a dislocation source of Frank-Read type if it is swept by a half-dislocation of a kind that restores lattice order. Dislocation sources will also arise in other major lattice types, through the condensation of vacancies on close-packed lattice planes.

9867 The Theory of Small Angle Scattering From Dislocations. H. H. Atkinson and P. B. Hirsch. *Philosophical Magazine*, v. 3, no. 27, Mar. 1958, p. 213-228.

The small angle scattering of X-rays or neutrons from crystals containing a random network of dislocations is calculated.

9868 Cellular Eigenvalues for Titanium Metal. S. L. Altmann and N. V. Cohan. *Physical Society, Proceedings*, v. 71, Mar. 1958, p. 383-388.

A high-speed computer program for cellular computations on close-packed hexagonal metals was applied to Ti.

9869 Imperfections in Nearly Perfect Crystals. M. A. Jaswon. *Research*, v. 11, Mar. 1958, p. 108-113.

A survey of some representative imperfections in metal crystals, particularly dislocations, stacking faults, and vacancies.

9870* (Italian.) Thermodynamic Research on Metal Systems. **Ricerche termodinamiche su sistemi metallici. X.** Definition of the Miscibility Gap and Replotting of the State Diagram for the Zn-Cd-Bi System. **Definizione della lacuna di miscibilità e ricostruzione del diagramma di stato per il sistema Zn-Cd-Bi.** Mario Fiorani and Luigi Oleari. *Ricerca Scientifica*, v. 27, no. 12, Dec. 1957, p. 3614-3628.

Determining the partial molar thermodynamic quantities for Zn in the Zn-Cd-Bi system and applying them to the definition of the miscibility gap at 450, 500, and 550 C. Application to Bi and Cd.

9871 Orientation and Anisotropy in Low-Carbon Steel Sheets. R. S. Burns and R. H. Heyer. *Sheet Metal Industries*, v. 35, Apr. 1958, p. 261-274.

Directionality of the type measured by the tear test is due principally to inclusions and iron-carbide stringers. Plastic anisotropy can be related to crystallographic texture as determined by X-ray pole figures.

9872* (Czech.) Effect of Magnesium on the Graphitization of Cast Iron. **Vliv hořčíku na grafitisaci litiny.** K. I. Vaščenko and R. P. Todorov. *Slévárenství*, v. 6, no. 3, Mar. 1958, p. 65-71.

Effect of 0.00 to 0.082% Mg on the graphitization of nodular iron. The value of growth of the cast iron volume before shrinkage changes with Mg content, which means that a considerable part of the graphite in nodular iron is formed by the decomposition of cementite.

9873 Investigation of Ultrasonic Grain Refinement in Beryllium. N. Maropis and J. B. Jones. *U. S. Atomic Energy Commission, NYO-7788*, Feb. 1957, 94 pp. (UF767 U3ny Contin.)

A controlled-atmosphere induction-heated furnace was devised for treatment of melted Be with ultrasonics. Treatment over a range of power and frequency did not reduce grain size below that accomplished by chill casting in any of the Be melts, including those with Ni, Zr, Si, or Ti additives. Nucleation was initiated essentially at external surfaces.

9874 Fundamentals of Diffusional Bonding. II. L. S. Castleman and L. Seigle. *U. S. Atomic Energy Commission Report No. SEP-245*, Feb. 15, 1958, 24 pp. (UF767 Un3.1se Contin.)

Preparation of γ-phase incremental couples; X-ray absorption apparatus for diffusion studies; preparation of other diffusion couples. Results with Al-Ni, Sb-Sn, Al-Sb, and Cu-Ag systems.

9875 Dimensional Instability of Uranium. II. R. Resnick, L. S. Castleman, and L. Seigle. *U. S. Atomic Energy Commission Report No. SEP-246*, Feb. 15, 1958, 14 pp. (UF767 Un3.1se Contin.)

Anisotropy of self-diffusion of α-U; the effect of grain size and other factors on the growth during irradiation.

9876* (Russian.) Radiographic Investigation of Certain Systems of Transitional Metals. **Rentgenostrukturnoe issledovanie nekotorykh sistem perekhodnykh metallov.** E. E. Cherkashin, et al. *Zhurnal Neorganicheskoi Khimii*, v. 3, no. 3, Mar. 1958, p. 650-653.

Binary and tertiary alloys of Mn, Be, Cr, V, Mo, W, Ta, Nb, Co, Ge, Sn, Ni, Si, Zr, and Fe in various combinations were investigated.

9877* (Russian.) The GaSb-InSb Quasi-Binary Section of the Gallium-Indium-Antimony System. **Kvazibinarnyi razrez GaSb-InSb sistemy gallii-indii-sur'ma.** I. E. Gorshkov and N. A. Goriunova. *Zhurnal Neorganicheskoi Khimii*, v. 3, no. 3, Mar. 1958, p. 668-672.

Radiographic and thermal analysis of the system confirm the presence of a continuous series of substitutive solid solutions.

9878* (Russian.) Investigation of the Ni_2Ti-Ni_2Ta and Ni_2Ti-Ni_2Nb Binary Systems. **Issledovanie dvoinykh sistem Ni_2Ti-Ni_2Ta; Ni_2Ti-Ni_2Nb.** I. I. Kornilov and E. N. Pylaeva. *Zhurnal Neorganicheskoi Khimii*, v. 3, no. 3, Mar. 1958, p. 673-677.

Specific electric conductivity, hardness, specific weight, and crystallization temperature were investigated. Equilibrium diagrams for both systems are presented.

9879* (Russian.) Investigating the Phase Equilibrium Diagram of the Co-Cr-Ti System. **Issledovanie diagrammy fazovogo ravnovesiia sistemy Co-Cr-Ti.** B. G. Livshits and Ia. D. Khorin. *Zhurnal Neorganicheskoi Khimii*, v. 3, no. 3, Mar. 1958, p. 685-693.

Study of compositions in the Co corner of the diagram with Cr content up to 55% and Ti content up to 45%.

9880* (Russian.) Investigating Alloys of the Tertiary System Nickel-Aluminum-Tungsten. **Issledovanie splavov troinoi sistemy nikel'-aliuminii-vol'fram.** P. B. Budberg. *Zhurnal Neorganicheskoi Khimii*, v. 3, no. 3, Mar. 1958, p. 694-698.

Characteristics of phases in specimens containing up to 30% Al and 40% W.

9881* (Russian.) Reaction Between Titanium Carbide and a Six-Component Nickel Solid Solution. **Vzaimodeistvie kabida titana s shestikomponentnym nikelevym tverdym rastvorom.** I. I. Kornilov, L. I. Priakhina, O. V. Ozhimkova, and A. Ia. Snetkov. *Zhurnal Neorganicheskoi Khimii*, v. 3, no. 3, Mar. 1958, p. 708-716.

Discusses possibility of study of multi-component systems by investigation of equilibrium between a limited number of phases. Investigates reactions between TiC and a 6-component Ni-rich solid solution of the following composition: Ni-82%, Cr-7%, W-3%, Mo-3%, Al-3%, and Nb-2%.

9882* (Russian.) Investigation of Metallic Compounds in a Multi-Component Ni-Base Alloy. **Issledovanie metallicheskikh soedinenii v mnogokomponentnom splave na nikelevoi oshove.** P. B. Golubtsova, and L. A. Mashkovich. *Zhurnal Neorganicheskoi Khimii*, v. 3, no. 3, Mar. 1958, p. 717-721.

Methods for selective separation of various phases. Characteristics of inclusions.

9883* (Russian.) Growing Selenium Hexagonal Single Crystals. **Vyrashchivanie monokristallov geksagonal'nogo selena.** P. T. Kozyrev. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 3, Mar. 1958, p. 500-505.

Describes deposition of Se monocrystals from the vapor phase and also a method of growing from a melt.

9884* (Russian.) X-Ray Determination of Heterodiffusion in Alloys With Components Considerably Different in X-Ray Absorption. **Rentgenograficheskoe opredelenie koeffitsientov geterodiffuzii v splavakh komponent s rezko razlichaiushchimsia pogloshcheniem rentgenovskikh luchei.** B. Ia. Pines and I. V. Smushkov. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 3, Mar. 1958, p. 661-667 + 1 plate.

9885* (Russian.) X-Ray Determination of Heterodiffusion Coefficients in Systems Cr-Mo and Ni-W. **Rentgenograficheskoe opredelenie koeffitsientov geterodiffuzii v sistemakh Cr-Mo i Ni-W.** B. Ia. Pines and I. V. Smushkov. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 3, Mar. 1958, p. 668-673 + 1 plate.

See also: **9473** (the In-Se system); **9642** (three-dimensional microscopy); **9712** (hydrogen mobility in steel); **9716** (production of Si single crystals); **9719** (oxide inclusions in steel); **9746** (eutectic nucleation of cast iron); **9775** (effect of microstructure on internal friction of Fe-C alloys); **9776** (metallography in fatigue); **9778** (Al-Mg-Si, Al-Cu-Mg, and Cu-Zn-Sn systems); **9798** (twinning in Ti and α-U); **9811** (microstructure and machineability in carbon steel); **9956** (electronic structure of metals); **10042** (dislocations in AgCl); **10249** (transformation in welded high-strength steels).

METALS—POWDER

9886* (Russian.) Rhenium Borides. **O boridakh reniia.** V. S. Neshpor, Iu. B. Paderno, and G. V. Samsonov. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 3, Jan. 21, 1958, p. 515-516.

Investigation of the phase compositions of Re_3B, Re_2B, Re_3B_2, ReB, Re_2B_3, Re_3B_4, Re_2B_3, ReB_2, and Re_2B_5 prepared by the powder method at 1900 C.

9887 Effect of Structure of Titanium-Tungsten Carbide Compositions Upon the Life of Tool Tips. P. K. Mikhailova. *Henry Brutcher Translation No.* 3966, 4 pp. (From *Stanki i Instrument*, v. 28, no. 6, 1957, p. 26.) Henry Brutcher, Altadena, Calif.

By a suitable choice of the structure of carbide particles, the life of cutting tools can be increased 2-3 fold. In bodies containing 66% WC, 30% TiC, 4% Co or 79% WC, 15% TiC, 6% Co the (Ti,W) C grains can be either single-phase or two-phase (annular type of structure). The presence of the two-phase type of grains shortens the life of cutting tips by 50 to 70%. The properties of 79WCl5TiC6Co carbide tips are affected also by the ratio of the size of the (Ti,W) C particles to that of the WC particles.

9888 Pressure Correlations in the Production of Hard-Metal Powder Compacts. A. G. Samoilov. *Henry Brutcher Translation No.* 4071, 8 pp. (From *Izvestiia Akademii Nauk SSSR, Otd. Tekh. Nauk*, no. 2, Feb. 1957, p. 159-162.) Henry Brutcher, Altadena, Calif.

Compacting and ejecting pressures were determined on specimens of 85% WC - 15% Co (20% - 20μ and 75%-0.5μ) and 79% WC - 15% TiC - 6% Co (100% - 0.5μ). Compacts were prepared by pressing various weights of the mixtures in a steel die. The pressure required to eject compacts from the dies in which they are made is on the average only 44% of the pressure difference between the top and bottom faces of the compact during compacting.

9889 The Production and Characteristics of Chemically Precipitated Nickel Powder. K. O. Cockburn, R. J. Loree, and J. B. Haworth. *Metal Powder Association, Proceedings 13th Annual Meeting*, v. 1, 1957, p. 10-24. (TN695 N56p)

Describes process operated by Sherritt Gordon Mines, Ltd. in their Fort Saskatchewan refinery. Ni powders are produced in sizes ranging from −100m to −325m. and in purity up to 99.9%. About 30 tons of the powder is produced per day.

9890 Panel Discussion on Presses for Compacting Metal Powders. *Metal Powder Association, Proceedings 13th Annual Meeting*, v. 1, 1957, p. 58-82. (TN695 M56p)

Contains six short papers delivered by representatives of U. S. press supply companies. The panelists describe both American and European style units. Construction, operation, and fields of application of single punch, simple motion presses are compared with multiple punch, multiple motion, and rotary equipment.

9891 Fundamentals of Powder Metallurgy. G. C. Kuczynski. *Metal Powder Association, Proceedings 13th Annual Meeting*, v. 1, 1957, p. 125-130. (TN695 M56p)

Surveys recent additions to the knowledge of sintering phenomena. The thermodynamical motivation of sintering is the excess surface energy contained in a mass of powder. This energy excess is not large, but its existence insures a tendency towards coalescence of the particles, provided sufficiently efficient mechanisms of sintering are available. Most observations of the progress of sintering of powder compacts suggest two largely overlapping stages of this process. The first early stage, manifesting itself by a rapid decrease of electrical resistivity and increase of cohesion with no appreciable change in density, is attributed to the formation of bridges or necks between the adjacent particles. The second stage, during which densification of the compact occur, is due to the elimination of the voids remaining in the compact.

9892 Cermets as Potential Materials for High-Temperature Service. O. A. Sandven. *North Atlantic Treaty Organize-*

tion, AGARD Report No. 99, Apr. 1957, 24 pp. (TL565 Ag11r Vis.)

Reviews chemical, physical, and mechanical properties of a wide range of carbides, borides, nitrides, silicides, and TiC cermets.

9893 Influence of Additives on Particle Size of Tungsten Powder Prepared by Reduction With Hydrogen From Tungsten Trioxide. H. L. Spier and W. L. Wanmaker. *Philips Research Reports,* v. 13, no. 2, Apr. 1958, p. 149-156.

Reduction with hydrogen of tungstic acid and tungsten trioxide doped with various additives. Addition of potassium silicate and potassium silico-tungstate results in a marked growth of the tungsten particles, while other additives such as calcium nitrate or magnesium sulfate tend to give a small particle size.

9894 Fiber Metallurgy. R. H. Read, W. Pollack, and S. W. McGee. *Precision Metal Molding,* v. 16, Apr. 1958, p. 25 + 3 pages.

Fiber sources; metal fiber felting; sintering felted fibers; rolling or press forming; applications of porous fiber metal materials; fiber metal base composite materials.

9895 Preliminary Report on the Metal Powder Slip Casting Process. I. Henry H. Hausner, Donald P. Ferriss, Edmund B. Wilson, and Frank W. Heck. *U. S. Atomic Energy Commission, NYO-*8528, Sept. 9, 1957, 31 pp. (UF767 U3ny Contin.)

Slip casting of stainless steel powder is a process which results in a very dense sintered material. The slip casting process is described in detail and the raw materials, such as metal powders and deflocculants, are discussed. Viscosity of the slip is not of prime importance in the process, but rather its pH value. Selection of raw materials and the processing steps for slip castings of high "green" strength.

NONDESTRUCTIVE TESTING AND QUALITY CONTROL

9896 Experience in Non-Destructive Testing of Welded Tubes. H. D. Weise. *Henry Brutcher Translation No.* 4073, 17 pp. (From *Schweissen und Schneiden,* v. 8, no. 10, 1956, p. 355-364.) Henry Brutcher, Altadena, Calif.

Experience leads inspectors to regard ultrasonic testing as a preliminary means of inspection of tube welds with roots that have not been rewelded, and to apply radiography or gammagraphy to doubtful places.

9897 Inspection of Castings With Radioisotopes [Gamma Rays]. B. B. Gulyaev and L. G. Demina. *Henry Brutcher Translation No.* 4078, 7 pp. (From *Liteinoe Proizvodstvo,* no. 9, Sept. 1956, p. 18-20.) Henry Brutcher, Altadena, Calif.

Characteristics of principal radioisotopes available for γ-radiography. Classification of defects by ease of detection with γ-rays. Determination of distribution of flaws, their distance from the surface of the casting, and their dimensions.

9898 Automatic Electromagnetic and Ultrasonic Inspection of [Steel] Billets. V. Husarek. *Henry Brutcher Translation No.* 4110, 12 pp. (From *Stahl und Eisen,* v. 77, no. 21, 1957, p. 1483-1487.) Henry Brutcher, Altadena, Calif.

9899 A New Approach to the Measurement of Coating Thickness by Fluorescent X-Ray Absorption. Fred A. Achey and Earl J. Serfass. *Electrochemical Society, Journal,* v. 105, Apr. 1958, p. 204-205.

If both plate and base metals yield fluorescent X-rays, balanced filters are used for isolating the fluorescence from the base metal.

9900 Gamma Radiography: Comparison of British and Soviet Equipment. *Engineering,* v. 185, Apr. 4, 1958, p. 444-446.

Deals with both low- and high-intensity radiographic equipment, and apparatus for remote handling and for simultaneous radiography of several items.

9901* (Czech.) Thickness Measurement of Tin and Lead Coatings With a Radioisotope Back-Reflection Method. **Měření tlouštky cínových a olověných povlaků odrazovou metodou radioisotopy.** Jaromír Kuba and Jaroslav Hladík. *Hutnické Listy,* v. 13, no. 3, Mar. 1958, p. 230-233.

Measuring thickness of Sn coatings and determining the most advantageous thickness ranges of Sn and Pb coatings using S-35, Tl-204, Sr+Y-90, and Ru+Rh-106 radioisotopes. In the choice of radioisotopes it is necessary to take into consideration also the thickness of the base material. For currently manufactured Sn and Pb coatings the Tl-204 radioisotope gives best results.

9902 Automatic Gauge Control in Rolling Mills. R. B. Sims. *Institute of Metals, Journal,* v. 86, pt. 7, Mar. 289-302.

Causes and correction of gage variations in flat rolling; specification and design of an automatic gage controller; methods of maintaining strip thickness by varying either the position of the mill screws or the applied strip tension.

9903 The Inspection of Tubes for Flaws and Variations in Thickness. J. B. C. Robinson and L. T. Perriam. *Institute of Metals, Journal,* v. 86, pt. 7, Mar. 1958, p. 316-322.

Metallurgical and physical conditions of tubing as they affect eddy-current techniques; use of eddy currents for inspecting condenser tubes after a period of service and for detecting flaws in tubes during production.

9904* Instruments Designed for Nondestructive Measurement of Coating Thickness. Charles Schuettler. *Paint Industry Magazine,* v. 73, Feb. 1958, p. 17 + 2 pages.

9905 Experience With Thulium Radiography at the MTR. S. D. Reeder. *U. S. Atomic Energy Commission, IDO-*16333, Oct. 25, 1957, 37 pp. (UF767 Un3.1id Contin.)

Studies related to the production and use of Tm-170 for radiographic purposes indicate that production of Tm-170 is not seriously inhibited by its own neutron capture. A portable radiographic camera was designed.

See also: **9763** (nondestructive testing of castings).

NUCLEAR PHYSICS, NUCLEONICS, AND RADIATION

9906* (German.) Research Reactors. **Forschungsreaktoren.** Gustav Ortner. *Acta Physica Austriaca,* v. 11, no. 4, Mar. 1958, p. 422-433.

A study of different nuclear reactors used for research from the viewpoint of their neutron flux properties, effect of temperature on the reactivity, and average life of the fission neutrons. Safety tests.

9907* (German.) More Recent Methods of Particle Acceleration. **Neuere Methoden der Teilchenbeschleunigung.** W. Jentschke. *Acta Physica Austriaca,* v. 11, no. 4, Mar. 1958, p. 485-510.

Classical circular acceleration: cyclotron, betatron, and synchrotron. Alternating gradient focusing. Fixed frequency alternating gradient machines: radical sector type and spiral shaped accelerator.

9908 Spin-Disorder Effects in the Electrical Resistivities of Metals and Alloys. B. R. Coles. *Advances in Physics,* v. 7, no. 25, Jan. 1958, p. 40-71.

Resistivity anomalies and magnetic ordering in rare earth metals; atomic and magnetic ordering in transition metal alloys; the transition metals; dilute alloys.

9909 (Russian.) New Mechanism of Relativistic Electron Production in Cosmic Space. **O novom mekhanizme generatsii reliativistskikh elektronov v kosmicheskom prostranstve.** V. I. Veksler. *Akademiia Nauk SSSR, Doklady,* v. 118, no. 2, Jan. 11, 1958, p. 263-265.

Indicates the existence of a simple mechanism of generation of fast electrons which may be the cause of radio emissions coming to the earth from cosmic bodies. The motion of a quasi-neutral bundle of fully ionized plasma in a nonuniform magnetic field must be accompanied by production of the relativistic electrons. This is based on the law of conservation of energy.

9910 Design and Uses of a Light-Water-Moderated Subcritical Assembly. E. W. McDaniel and T. A. Elliott. *American Journal of Physics*, v. 26, no. 3, Mar. 1958, p. 168-174.

9911 Nucleonics. W. Wayne Meinke. *Analytical Chemistry*, v. 30, Apr. 1958, p. 686-728.

This comprehensive review of recent publications referring to application of radioactivity to chemical analysis is based on a bibliography of 1279 references.

9912* (French.) Electromagnetic Interactions of μ Mesons at Great Depths. **Interactions électromagnétiques des mésons μ aux grandes profondeurs.** L. Avan. *Annales de Physique*, v. 3, ser. 13, nos. 1-2, Jan.-Feb. 1958, p. 123-178.

Detailed analysis of three types of electromagnetic interactions of μ mesons in the earth: creation of collision electrons, slowing-down radiation, and direct creation of negatron-positron pairs.

9913* (French.) Elementary Particles. **Particules élémentaires.** J. M. Dolique. *Annales de Radioélectricité*, v. 13, no. 51, Jan. 1958, p. 3-17.

The physics of elementary particles before the discovery of "strange" particles. Laws governing these particles. Consequences of the abandonment of the parity principle.

9914* The Use of Group Divisible Designs for Confounded Asymmetrical Factorial Arrangements. Marvin Zelen. *Annals of Mathematical Statistics*, v. 29, no. 1, Mar. 1958, p. 22-40.

9915* Nonlinear Effects in Alternating-Gradient Synchrotrons. P. A. Sturrock. *Annals of Physics*, v. 3, Feb. 1958, p. 113-189.

Study of resonances in the betatron oscillation mechanism over and above those which arise in linear theory. Practical formulas were obtained by using a perturbation procedure.

9916* Properties of Nuclear Matter. L. C. Gomes, J. D. Walecka, and V. F. Weisskopf. *Annals of Physics*, v. 3, Mar. 1958, p. 241-274.

Reviews recent theories. Discusses applicability of the independent-particle model. Determines validity of the model for particular features of nuclear forces.

9917* (English.) **Isomeric State in Bi^{206}.** E. Arbman and P. A. Tove. *Arkiv för Fysik*, v. 13, no. 1, 1958, p. 61-67.

A half-life of $7.8 \pm 0.3\mu$ sec. was measured for the 59.9 kev. *E2* transition in Bi^{206}. Delayed coincidence studies show that all strong γ-rays from the decay of Po^{206} precede the 59.9 kev. transition. The spins of the levels in Bi^{206} are discussed.

9918* (English.) **Elastic and Inelastic Scattering of K^+-Particles in Nuclear Emulsions.** K. Kristiansson. *Arkiv för Fysik*, v. 13, no. 1, 1958, p. 91-100.

9919* (English.) **Nuclear Collision Stopping of Astatine Atoms.** R. B. Leachman and H. Atterling. *Arkiv för Fysik*, v. 13, no. 2, 1958, p. 101-108.

The ranges and range stragglings of At atoms stopped in Al and Ag were measured. The reactions $Au^{197}(C^{12}, xn)$ At were used to provide At atoms with velocities near the Bohr velocity for which stopping is principally by nuclear collisions.

9920* (English.) **A Study of the Gamma Rays of Pb^{206} From the Decay of Bi^{206} by the Method of External Conversion in Uranium.** Tihomir Novakov, Sölve Hultberg, and Birgit Andersson. *Arkiv för Fysik*, v. 13, no. 2, 1958, p. 117-128.

Relative intensities of 20 γ-rays following the decay of Bi^{206} were determined by a β-spectrometric study of photoelectrons ejected in a 3 mg/cm^2 U converter. A new method of analysis of the recorded photolines was used.

9921* (English.) **Gamma Transitions in the Decay of La^{142}.** Hans Ryde and Carl Johan Herrlander. *Arkiv för Fysik*, v. 13, no. 2, 1958, p. 177-183.

The half-lives of the isotopes La^{141} and La^{142} are (3.76 ± 0.10) h and (81 ± 3) m. Six new γ-rays with the energies 1.0, 1.8, 2.0, 2.4, 2.9, and 3.4 mev. are found by measurements with a 4-in. x 4-in. NaI(Tl) crystal.

9922* (English.) **Carbon Dioxide Proportional Counting for Natural Radiocarbon Measurements.** H. Göte Östlund. *Arkiv för Kemi*, v. 12, no. 1, 1958, p. 69-78.

Preparation and purification of CO_2 for use in a proportional counting tube; apparatus for radiocarbon age determinations; results obtained.

9923* (Russian.) History of Cyclotron Development. **Istoriia razvitiia tsiklotrona.** L. M. Nemenov. *Atomnaia Energiia*, v. 4, no. 2, Feb. 1958, p. 117-127 + 2 plates.

A brief review of the development of the cyclotron elements. Basic parameters of the most commonly used cyclotrons are given.

9924* (Russian.) The Passage of Scattered Gamma Rays Through Water. **Prokhozhdenie rasseiannogo γ-izlucheniia v vode.** V. I. Kukhtevich, Iu. A. Kazanskii, Sh. S. Nikolaishvili, and S. G. Tsypin. *Atomnaia Energia*, v. 4, no. 2, Feb. 1958, p. 138-143.

Attenuation of scattered γ quanta from Au^{198}, Co^{60}, and Na^{24} was measured at varying source-detector distances and angles of collimation.

9925* (Russian.) A Study of Intense Pulsed Gas Discharges by Means of High-Speed Photography. **Issledovanie moshchnogo impul'snogo razriada v gazakh s pomoshch'iu skorostnoi fotosemki.** N. A. Borzunov, D. V. Orlinskii, and S. M. Osovets. *Atomnaia Energiia*, v. 4, no. 2, Feb. 1958, p. 149-153 + 5 plates.

Basic processes occurring in the initial stage of intense discharges are studied by comparing the oscillograms of current and voltage with photographs of impulse discharges in deuterium and in certain inert gases. Pictures were taken at the rate of 10^6 frames per sec.

9926* The Analysis of Nuclear Particle Tracks by Digital-Computer. Y. Goldschmidt-Clermont. *Discovery*, v. 19, Apr. 1958, p. 148-152.

9927* (Czech.) Atomic Power. **Atomová energie.** Lubomír Šrek. *Elektrotechnik*, v. 13, no. 3, Mar. 1958, p. 66-69.

Schemes of controlled and uncontrolled fission, atom chain reactions in nuclear fuel, and principles of moderator action. Design and control of homogeneous and heterogeneous heavy water reactors.

9928 Engineers Joint Council, Nuclear Engineering & Science Conference, Preprints, 1958. Individual papers separately paged. American Institute of Chemical Engineers, New York. (TK9006 En34p Vis.)

Preprints of 144 papers delivered at the meeting sponsored by the Engineers Joint Council, held at Chicago, Ill., on Mar. 17-28, 1958. Topics include nuclear reactor components, operation, instrumentation, and various other phases of nuclear physics.

9929 A Study of the Feasibility of a Tracer System for Locating a Fuel-Element Failure in a Pressurized Water Reactor. Meyer Pobereskin, Duane N. Sunderman, Aaron Eldridge, George D. Calkins, and Walston Chubb. *Engineers Joint Council, Nuclear Engineering & Science Conference Preprint* 140, 1958, 31 pp. (TK9006 En34p Vis.)

The proposed method consists in adding small amounts of different pairs of elements to the fuel alloy of each subassembly. These elements become activated during operation of the reactor, producing radioisotopes. When a fuel-element failure has occurred, a portion of the coolant is analyzed radiochemically for the elements added to the fuel as tracers. The radioactive species of the elements that are detected indicate the subassembly in which the failure has occurred. Suitable tracer elements include Er, Ga, Ho, Ir, Pt, Os, Re, Sc, Tb, Tm, and Yb.

9930* (German.) Chemistry and Nuclear Systematics of the Unstable Elements. **Chemie und Kernsystematik der Lückenelemente.** Tibor von Krakkay. *Fortschritte der Chemischen Forschung*, v. 3, no. 4, 1958, p. 738-821.

Artificial production of elements. Isolating Tc; its chemistry. Promethium, At, and Fr; existence of stable isotope of these elements. New definition of unstable elements. Berkelium. The so called magic numbers, especially 20, 50, 82, and 126. Magic number N=152 and spontaneous nuclear fission.

9931 The Temperature Distribution in a Heated Clay Block and Its Application to the Problem of Fission Product Disposal. C. B. Amphlett and D. T. Warren. *Great Britain, Atomic Energy Research Establishment, A.E.R.E. C/R* 1861, 1957, 7 pp. (UF767 G79.1a Contin.)

9932 Scale-Up Problems in the Plutonium Separations Program. O. F. Hill and V. R. Cooper. *Industrial and Engineering Chemistry*, v. 50, Apr. 1958, p. 599-602.

A review of engineering problems associated with the early development of processes for separating Pu on a commercial scale.

9933 Nuclear Resonance Spectrum of Al^{27} in Chrysoberyl. John H. Hockenberry, Jr., L. Carlton Brown, and Dudley Williams. *Journal of Chemical Physics*, v. 28, Mar. 1958, p. 367-372.

9934* Measurements of Ionization Cross Sections for Electron Impact. I. Technique and Data for Methane. B. A. Tozer. *Journal of Electronics and Control*, v. 4, no. 2, Feb. 1958, p. 149-159.

Difficulties encountered in adapting a Lozier-type ionization chamber for cross section measurements and methods of overcoming them. Measurements in CH_4.

9935 1958 Nuclear Congress. Sixth Hot Laboratories and Equipment Conference, March 19-21, 1958. 367 pp. American Institute of Chemical Engineers, New York. (QC799 H79 Over.)

Numerous facilities and techniques for irradiation and handling radioactive materials are described.

9936* Pluto—Measurement and Control. I. Basic Design Philosophy. J. Walker and F. E. Liddiard. **II. Nuclear Instrumentation.** W. E. Thompson. **III. Physical Instrumentation.** L. C. Whalley. *Nuclear Engineering*, v. 3, no. 25, Apr. 1958, p. 141 + 11 pages.

Principles and scope of instrumentation for a research reactor.

9937* Some Limitations and Principles of Nanosecond Time Measurement in Nuclear Physics. H. De Waard. *Nuclear Instruments*, v. 2, no. 2, Feb. 1958, p. 73-80.

9938* Direct and Compound Processes in Nuclear Reactions. M. Sano, S. Yoshida, and T. Terasawa. *Nuclear Physics*, v. 6, no. 1, 1958, p. 20-23.

The elastic and inelastic scattering of nucleons by nuclei are investigated, taking account of the direct and compound processes.

9939* Gas Ionization Neutron Detectors. W. Abson and A. L. Gray. *Nuclear Power*, v. 3, Apr. 1958, p. 160-165.

Design and operation of d. c. ionization chambers, and proton-recoil, BF_3-proportional, and fission counters.

9940* Reactor Instrumentation Systems. *Nuclear Power*, v. 3, Apr. 1958, p. 170 + 3 plates.

Diagrams show the main instrumentation features of three typical British reactors: gas-cooled, fast-breeder, and a materials testing reactor.

9941* A Portable Fast Neutron Monitor. W. G. Sparke and P. K. Tomkins. *Nuclear Power*, v. 3, Apr. 1958, p. 187-188.

Instrument provides a meter indication which is proportional to the biological dose over a wide range of fast neutron energies.

9942* Metallurgical Problems in Fabrication of Zirconium-Clad Fuel Elements for Pressurized Water Reactors. R. B. Gordon. *Nuclear Science and Engineering*, v. 3, Mar. 1958, p. 232-249.

Typical problems involving Zr cladding alloys, fuel materials, and the fuel element fabrication process.

9943* Effects of High Burnup on Natural Uranium. J. H. Kittel and S. H. Paine. *Nuclear Science and Engineering*, v. 3, Mar. 1958, p. 250-268.

The behavior under extended irradiation of U specimens having widely dissimilar textures was studied, and irradiation growth rates compared with thermal cycling growth rates.

9944 Fission-Product Yields From U, Th and Pu. Seymour Katcoff. *Nucleonics*, v. 16, Apr. 1958, p. 78-85.

Graphs of fission yields from U-235, U-233, Pu-239, Th-232, and U-238. Tables of fission yields and of U-235 decay chains and yields.

9945 Plastic Phosphor Matrix for Fast-Neutron Detection. B. Brown and E. B. Hooper, Jr. *Nucleonics*, v. 16, Apr. 1958, p. 96 + 4 pages.

Preparation, properties, and testing of plastic-phosphor button scintillators.

9946* (English.) **On the Decay Interactions of Neutral K_{e3} and $K_{\mu 3}$.** S. Furuichi. *Nuovo Cimento*, v. 7, ser. 10, no. 3, Feb. 1, 1958, p. 269-277.

The decay interactions of the processes $K^0 \rightarrow e + \upsilon + \pi c$ and $K^0 \rightarrow \mu + \upsilon + \pi c$ are investigated. Under the assumption that these processes occur through the weak Fermi interaction, the analysis was performed about the energy spectra and angular correlations of charged secondaries.

9947* (English.) **Spin-Orbit Coupling and Tensor Forces.** B. Jancovici. *Nuovo Cimento*, v. 7, ser. 10, no. 3, Feb. 1, 1958, p. 290-307.

The failure of tensor forces to account for the shell-model spin-orbit coupling is a strong indication for the existence of elementary mutual spin-orbit forces in the two-body interaction.

9948* (English.) **Nucleon - Nucleon Scattering at High Energy.** M. Gourdin. *Nuovo Cimento*, v. 7, ser. 10, no. 3, Feb. 1, 1958, p. 338-364.

9949* (English.) **"Composite" Model for K-Mesons.** S. N. Biswas. *Nuovo Cimento*, v. 7, ser. 10, no. 5, Mar. 1, 1958, p. 577-600.

Properties of the K-meson family. Feynman amplitude for two-boson systems. Solution of the wave equation and eigenvalue problem. Classification of the particles and rate of decay. Associated production.

9950* (English.) **Mass Reversal and Weak Interactions.** J. J. Sakurai. *Nuovo Cimento*, v. 7, ser. 10, no. 5, Mar. 1, 1958, p. 649-660.

Attempts to construct a theory of all weak processes from a single invariance principle. The requirement that the weak interaction Hamiltonian be invariant under the reversal of the sign of the mass in the Dirac equation separately for any fermion field leads to a unique form of the four-fermion interaction responsible for weak processes.

9951* (English.) **Remarks on the Measureability of Electromagnetic Fields.** G. Heber. *Nuovo Cimento*, v. 7, ser. 10, no. 5, Mar. 1, 1958, p. 677-684.

It is impossible to determine simultaneously the average of one component of the electromagnetic field over a microscopical space-time region and the position of this region exactly by means of really existing test bodies. Indeterminacy relations for this phenomenon are derived.

9952* (English.) **On the Theory of Stochastic Processes in Nuclear Reactors.** L. Pál. *Nuovo Cimento*, v. 7, ser. 10; Supplemento No. 1, 1958, p. 25-42.

A formulation in the most general manner of the fundamental equations describing the stochastic processes in reactors and a derivation from these of the generalized equations for the average neutron density and neutron importance, as well as for the fluctuation of neutron density.

9953* (English.) **Theory of Meson Multiple Production.** D. Ito and H. Tanaka. *Nuovo Cimento*, v. 7, ser. 10; Supplemento No. 1, 1958 p. 91-116.

Descriptions of Fermi-Landau type theories are derived in a field theoretical manner.

9954 Absorption of Negative K-Mesons and the Neutron and Proton Distributions in Heavy Nuclei. P. B. Jones. *Philosophical Magazine*, v. 3, no. 25, Jan. 1958, p. 33-41.

Observations on capture events producing a visible Σ^- hyperon, and on the ratio of π^- to K^- mesons created can give information on the relative neutron and proton densities in the part of the nuclear surface where the total density is less than 10% of the density at the center of the nucleus.

9955 The Interaction Rates of Stopped Negative Muons in Iron and Copper. A. M. Hillas, W. B. Gilboy, and R. M. Tennent. *Philosophical Magazine*, v. 3, no. 26, Feb. 1958, p. 109-118.

An apparatus suitable for measuring the mean lifetimes of negatively-charged muons brought to rest in targets of $Z < 30$ is described. Measurements on Fe and Cu yield mean lifetimes of $(204 \pm 14) \times 10^{-9}$ sec. and $(157 \pm 20) \times 10^{-9}$ sec. respectively.

9956 The Electronic Structure of the Metals of the First Transition Period. W. M. Lomer and W. Marshall. *Philosophical Magazine*, v. 3, no. 26, Feb. 1958, p. 185-203.

Elements of atomic number less than Fe have few 3d electrons and many conduction electrons, while for those above Fe this is reversed.

9957 Analysis of Nuclear Interactions of Energies Between 1000 and 100,000 BeV. B. Edwards, J. Losty, D. H. Perkins, K. Pinkau, and J. Reynolds. *Philosophical Magazine*, v. 3, no. 27, Mar. 1958, p. 237-266.

Twenty nuclear interactions produced by protons and ten produced by α-particles of energies above 1000 Bev. were analyzed.

9958 (English.) **Exactly Renormalizable Model in Quantum Field Theory. I. The Diagram Analysis.** Th. W. Ruijgrok. *Physica*, v. 24, no. 3, Mar. 1958, p. 185-204.

A simple model is considered for the interaction of a boson field with infinitely heavy nucleons, susceptible of an exact determination of the physical nucleon states and of the renormalization constants.

9959 Spin Temperature. A. Abragam and W. G. Proctor. *Physical Review*, v. 109, ser. 2, no. 5, Mar. 1, 1958, p. 1441-1458.

Theory and experiments supporting the validity of the concept of spin temperatures.

9960 Neutron Resonances in the kev Region: Differential Scattering Cross Sections. Robert C. Block, Willy Haeberli, and Henry W. Newson. *Physical Review*, v. 109, ser. 2, no. 5, Mar. 1, 1958, p. 1620-1631.

Measurements of differential scattering cross sections near 90 and 180° as a function of energy between 30 and 110 k.e.v. for 17 elements.

9961 Shell-Model Theory of Pb^{206}. William W. True and Kenneth W. Ford. *Physical Review*, v. 109, ser. 2, no. 5, Mar. 1, 1958, p. 1675-1697.

A shell model calculation, utilizing the same strength of internucleon force as observed in the two-body system, including configuration mixing with near lying states, ignoring mixing with highly excited configurations, and ignoring effects of nuclear deformation, can successfully predict the energy levels of Pb^{206} up to about 3.2 m.e.v.

9962 Emission of Secondary Neutrons From Nuclei Bombarded by High-Energy Neutrons. V. I. Gol'danskii, et al. *Physical Review*, v. 109, ser. 2, no. 5, Mar. 1, 1958, p. 1762-1769.

The mean number of secondary neutrons emitted in a single act of absorption of 120- and 380-m.e.v. neutrons by Be, C, Al, Fe, Cu, Sn, and Pb nuclei was determined for secondary neutron energies up to about 15-20 m.e.v.

9963 Nuclear Interactions of High-Energy μ Mesons in Carbon. I. B. McDiarmid. *Physical Review*, v. 109, ser. 2, no. 5, Mar. 1, 1958, p. 1792-1800.

A multiplate cloud chamber containing two large plastic scintillators capable of selecting nuclear interactions is described; 43 interactions, attributed to energetic μ mesons, were observed.

9964 Nuclear Gamma Ray Resonance in ^{48}Ti. V. Knapp. *Physical Society, Proceedings*, v. 71, Feb. 1958, p. 194-200.

Mean life of the 990 kev. level was $(6\pm2)\times10^{-13}$ sec.

9965 Neutron-Proton Scattering in the Energy Range 70 to 170 MeV. T. C. Griffith, A. P. Banford, M. Y. Uppal, and W. S. C. Williams. *Physical Society, Proceedings*, v. 71, Mar. 1958, p. 305-324.

The angular distributions of neutrons scattered by protons at effective energies of 96, 130, and 137 mev. and at angles between 19.3 and 78.1° in the center-of-mass system were measured using photographic emulsions.

9966* The Dispersion Relations for the Scattering of Photons From Proton. Tomoya Akiba and Iwao Sato. *Progress of Theoretical Physics*, v. 19, no. 1, Jan. 1958, p. 93-111.

Dispersion relations are derived for the non-forward amplitudes for photon-proton scattering. By expanding these relations in momentum transfer and retaining the first few terms, the dispersion relations for six independent combinations of the partial wave amplitudes are obtained.

9967 Close-In Fallout. *Rand Corporation, Report* R-309, Sept. 30, 1957, 40 pp. (T13 R15f Contin.)

Summary of the physical processes of radioactive fallout from nuclear weapons and of methods of computing fallout patterns. Emphasis is on fallout occurring within a few hundred miles of the weapon burst point.

9968 Advances in the Standard Proportional Counter Method of Fast Neutron Dosimetry. E. B. Wagner and G. S. Hurst. *Review of Scientific Instruments*, v. 29, Feb. 1958, p. 153-158.

The proportional counter method for measuring fast neutron dose in the presence of γ radiation was improved through redesign of the proportional counter, study of the behavior of the counter for various filling gases, and development of a more convenient form of the electronics necessary for pulse integration and dose indication.

9969 Absolute Assay and Study of Short-Lived Radionuclides by a Recoil Technique. F. S. Rowland and R. L. Wolfgang. *Review of Scientific Instruments*, v. 29, Mar. 1958, p. 210-214.

Nuclear recoil of the product isotope separates it from the target material and carries it into a "catcher" gas which is then swept into a counter.

9970 Statistical Weight of a System of Particles With Arbitrary Spins. V. S. Barashenkov and B. M. Barbashev. *U. S. Atomic Energy Commission AEC-tr*-3009, Nov. 1957, 12 pp. (UF767 Un3.1ae Contin.)

(Translated from the Russian.) Using recurrent relations instead of closed formulas makes simpler the drawing up of tables of statistical weights of systems of particles with the given spin. Tables are drawn up for cases which are important for the calculations in the multiple production theory for the energy range of about 10-15.

9971 Multiple Production of Heavy Particles in Two Nucleon Collisions. V. S. Barashenkov, B. M. Barbashev, E. G. Bubelev, and V. M. Maksimenko. *U. S. Atomic Energy Commission AEC-tr*-3028, 1957, 14 pp. (UF767 Un3.1ae Contin.)

(Translated from the Russian.) The probabilities of particle production in nucleon-nucleon collisions with the energy E=3 Bev and E=5 Bev were calculated using Fermi statistical theory and taking into account the conservation of baryon number, strangeness, isotopic spin as well as strong resonance pion and nucleon interaction in the state T=3/2 and P=3/2.

9972 Absolute (d,α) Reaction Cross Sections and Excitation Functions. Oswald U. Anders. *U. S. Atomic Energy Commission, AECU*-3513, Apr. 26, 1957, 251 pp. (UF767 U3au Contin.)

Investigation involved the bombardment of thin targets of metallic Zr, Mo, and Ti as well as of ZnS, subsequent chemical separation of the product nuclei, identification of the products by X-ray and γ-spectroscopy, and determination of the absolute disintegration rates of β- and X-ray emitting isotopes.

9973 Nuclear Decay Scheme Analysis and Characterization Studies of (d, α) Reaction Products. Donald Glenn Gardner. *U. S. Atomic Energy Commission, AECU*-3514, May 15, 1957, 232 pp. (UF767 U3au Contin.)

Nuclear theory; γ and β spectral analysis; use of digital computers; nuclear decay scheme studies on the isotopes Co^{62}, Y^{90}, Ir^{190}, and Sc^{47}.

9974 Resonance Escape Probability in Slab Lattices. Noel Corngold. *U. S. Atomic Energy Commission, BNL*-445 (T-93), Feb. 1958, 30 pp. (UF767 Un3.1bn Contin.)

A study of the slowing down of neutrons in a lattice consisting of alternate slabs of non-capturing moderator and nonmoderating fuel whose cross sections vary arbitrarily with energy.

9975 Heat Flux at Burnout in Stagnant Water. Samuel Mirshak. *U. S. Atomic Energy Commission, DP-262*, Dec. 1957, 11 pp. (UF767 Un3.1dp Contin.)

The heat flux required to melt vertical tubes of stainless steel, submerged in stagnant water at atmospheric pressure, was measured as the temperature of the ambient water was varied from 10 to 100 C.

9976 Distribution of U^{235} in an Irradiated Thorium Slug. R. G. Nisle and E. Fast. *U. S. Atomic Energy Commission, IDO-16419*, Oct. 21, 1957, 16 pp. (UF767 Un3.1id Contin.)

9977 Kinetic Studies on the Spert I Reactor. II. On the Initial Shutdown of the Spert I Reactor for Periods Greater Than 50 Milliseconds. L. I. Deverall and G. W. Griffing. *U. S. Atomic Energy Commission, IDO-16404*, Dec. 26, 1957, 17 pp. (UF767 Un3.1id Contin.)

9978 An Evaluation of the Calder Hall Type of Nuclear Power Plant. W. F. Banks, G. A. Schneider, W. T. Morgan, and E. B. Ash. *U. S. Atomic Energy Commission, NAA-SR-1833*, Jan. 18, 1957, 107 pp. (UF767 Un3.1na Contin.)

Design and cost considerations for a natural uranium, graphite-moderated, CO_2-cooled reactor with a net electrical output of 130 MWE.

9979 Preliminary Heat Transfer Studies of OMR Fuel Elements. E. B. Baumeister and C. W. Wheelock. *U. S. Atomic Energy Commission, NAA-SR-1998*, Nov. 15, 1957, 44 pp. (UF767 Un3.1na Contin.)

Heat transfer and pressure drop characteristics for several organic-moderated reactor fuel element types. Effects of longitudinal variations of fuel loading and flow rate.

9980 Preliminary Design of a Calandria Core for the Sodium Reactor Experiment. J. E. Mahlmeister. *U. S. Atomic Energy Commission, NAA-SR-2151*, 58 pp. (UF767 Un3.1na Contin.)

9981 Reactor Safety Quarterly Progress Report, April-June 1957. Norman C. Miller. *U. S. Atomic Energy Commission, NAA-SR-2224*, Mar. 15, 1958, 22 pp. (UF767 Un3.1na Contin.)

Data on safety devices for production, power, and research reactors.

9982 A Guide to the Calculation of Criticality Limits for Enriched Uranium. J. Chernick. *U. S. Atomic Energy Commission, NP-6500*, Jan. 1957, 11 pp. (UF767 Un3.1np Contin.)

9983 Reactor Safety System Response. F. P. Green. *U. S. Atomic Energy Commission, ORNL-2318*, Feb. 14, 1958, 101 pp. (UF767 U3o Contin.)

Program to evaluate the performance of a safety system; device for determining the release time of rods installed in a reactor; experimental evaluation of electromagnets for research reactors; acceleration of reaction control rods; analog simulation of corrective action for a nuclear excursion.

9984 Reactor Heat Transfer Conference of 1956. John E. Viscardi, compiler. *U. S. Atomic Energy Commission, TID-7529* (pt. 1), v. 2, Nov. 1957, p. 317-635. (UF767 Un3ti Contin.)

A collection of technical papers and conference reports.

9985 Minutes of the Fifth Tripartite Instrumentation Conference Brookhaven National Laboratory October 22-26, 1956. *U. S. Atomic Energy Commission, TID-7543*, Feb. 1958, 179 pp. (UF767 Un3ti Contin.)

Summaries of 56 papers on reactor instrumentation.

9986 A Compendium of Thermal Neutron Cross Sections Averaged Over the Spectra of Wigner and Wilkins. Harvey J. Amster. *U. S. Atomic Energy Commission, WAPD-185*, Jan. 1958, 154 pp. (UF767 Un3.1wa Contin.)

Values of 21 energy-dependent microscopic cross sections were estimated on the basis of the latest experimental data and averaged up to 0.625 ev. over Wigner-Wilkins neutron spectra for 700 mixtures of U-235, Pu-239, a 1/v absorber, and a H moderator.

9987* (Russian.) Nuclear Isomerism and the Structure of Atom Nuclei. **Iadernaia izomeriia i struktura atomnykh iader.** L. I. Rusinov and G. M. Drabkin. *Uspekhi Fizicheskikh Nauk*, v. 64, no. 1, Jan. 1958, p. 93-112.

The basic conceptions of the generalized nucleus model and their relation to the properties of isomeric nuclei.

9988* (Russian.) Physical Principles of Contemporary Resonance Accelerators. **Fizicheskie osnovy sovremennykh rezonansnykh uskoritelei.** V. I. Kotov, A. B. Kuznetzov, and N. B. Rubin. *Uspekhi Fizicheskikh Nauk*, v. 64, no. 2, Feb. 1958, p. 197-272.

Movement of charged particles within the magnetic field and in cyclic resonance accelerators. Certain types of cyclic resonance accelerators, such as the synchrotron, phasotron, synchrophasotron, and microtron, as well as the linear and the strong-focusing accelerators, are described as to their performance and efficiency.

9989 (Russian.) Low Energy γ-Transitions in Tm^{169}. **Nizkoenergeticheskie γ-perekhody Tu^{169}.** K. N. Shliagin and P. S. Samoilov. *Zhurnal Eksperimental'noĭ i Teoreticheskoĭ Fiziki*, v. 34, no. 1, Jan. 1958, p. 29-32.

Study of the electron spectrum of Yb^{169} in the energy range from 3 to 70 kev. with a magnetic β-spectrometer.

9990 (Russian.) Bremsstrahlung π Mesons and Formation of π-Meson Pairs by γ-Quanta in Collisions With Nonspherical Nuclei. **Tormoznoe izluchenie γ-kvantov π-mezonami i obrazovanie π-mezonnykh par γ-kvantami pri stolknovenii s nesfericheskimi iadrami.** I. T. Diatlov. *Zhurnal Eksperimental'noĭ i Teoreticheskoĭ Fiziki*, v. 34, no. 1, Jan. 1958, p. 80-86.

Calculation of effective cross sections for a number of radiative processes occurring in the interaction of high energy π-mesons with nonspherical nuclei.

9991 (Russian.) Motion of Ions in a Mixture of Isotopes. **O dvizhenii ionov v smesi izotopov.** Iu. M. Kagan and V. I. Perel'. *Zhurnal Eksperimental'noĭ i Teoreticheskoĭ Fiziki*, v. 34, no. 1, Jan. 1958, p. 126-128.

Derivation of equations for the drift velocity of isotopic ions in a mixture of isotopes.

9992 (Russian.) Polarization of Slow Neutrons Scattered in Crystals. **O poliarizatsii medlennykh neitronov pri rasseianii v kristallakh.** S. V. Maleev. *Zhurnal Eksperimental'noĭ i Teoreticheskoĭ Fiziki*, v. 34, no. 1, Jan. 1958, p. 129-130.

Derivation of formulas.

9993* (Russian.) Explosion Showers Produced by High Energy Cosmic Ray Particles. **Vzryvnye livni obrazovannye kosmicheskimi chastitsami bol'shoi energii.** I. I. Gurevich, A. P. Mishakova, B. A. Nikol'skii, and L. V. Surkova. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*, v. 34, no. 2, Feb. 1958, p. 265-279.

Data on 43 shower cases caused by nucleons with an energy range from 10^{13}-10^{14}ev, and 20 showers produced by particles with a charge of 2 or more. Asymmetry in the angular distribution of shower particles with respect to the angle $\pi/2$ in the c.m.s. is observed in showers produced by nucleons possessing an energy $> 10^{11}$ev. This contradicts the concept of shower production on nuclei in nucleon-nucleon collisions and the hydrodynamical theory of multiple production of particles.

9994* (Russian.) Scattering of μ-Mesons in Beryllium. **Rasseianie μ-mezonov v berillii.** V. G. Kirillov-Ugriumov and A. M. Moskvichev. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*, v. 34, no. 2, Feb. 1958, p. 322-326.

Study on scattering of cosmic μ mesons with impulses (130 ± 16) mev.c^{-1} in Be plates. The observed angular distribution agrees with the distribution expected for a coulomb interaction between μ-mesons and atoms of the substance.

9995* (Russian.) Determination of Capture Cross Sections of One and Two Electrons in Single Collisions of Doubly Charged Ions With Gas Atoms. **Opredelenie sechenii zakhvata odnogo i dvukh elektronov pri odnokratnykh stolknoveniiakh dvukhzariadnykh ionov s atomami gaza.** I. P. Flaks and E. S. Solov'ev. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 3, Mar. 1958, p. 612-622.

See also: **9139** (ThO_2-UO_2 fuel elements); **9170** (reactor coolants; processing nuclear fuels); **9189** (solvent extraction for reprocessing nuclear fuel); **9190** (pro-

cessing nuclear fuels); **9252** (preparation of UO_2 powder); **9347** (separation of U and Th); **9431** (information handling systems for nuclear measurements); **9503** (transistors in nucleonics); **9607** (atomic powered gas turbine); **9694** (corrosion of materials in NaK); **9905** (Tm radiography); **10024** (heat transfer in liquid metals); **10082** (pile irradiation of polyethylene); **10119** (γ-radiation on linear polyethylene).

OPERATIONS RESEARCH AND MANAGEMENT ENGINEERING

9996 Reliability Evaluation of the Human Component in Man-Machine Systems. H. L. Williams. *Electrical Manufacturing*, v. 61, Apr. 1958, p. 78-82.

Probability analysis techniques used by equipment reliability engineers can also be applied to analysis of the human factors in a system.

9997 Theory of Games: A Tool for Operational Research. S. Vajda. *Engineering*, v. 185, Mar. 21, 1958, p. 369.

9998* Instrumentation for Automatic Data Processing in Motion-Time Research. Delmar W. Karger. *Journal of Industrial Enigneering*, v. 9, no. 2, Mar.-Apr. 1958, p. 123-127.

9999 Human-Factors Engineering. I. Man and Machine. John D. Vandenberg. *Machine Design*, v. 30, Apr. 17, 1958, p. 108-113.

This introductory article of a series organized to provide a human-factors background for the designer contending with human limitations and capabilities centers on defining areas of human-factor activity and showing how they fit into the over-all design picture.

10000 Simulation Techniques in Operational Research. John Harling. *Operational Research Quarterly*, v. 9, no. 1, Mar. 1958, p. 9-21.

10001 Top Management Decision Simulation. The AMA Approach. Franc M. Ricciardi, et al. 126 pp. 1957. American Management Assn., New York. (HD31 Am35tm)

The "top management game" utilizes the electronic computer and new techniques of problem solving to simulate years of actual experience in decision making.

10002* How to Use Movies for Time and Motion Studies. George Vasiliou. *Wood and Wood Products*, v. 63, Apr. 1958, p. 27 + 3 pages.

Objectives, technique, and results of a "test case" involving use of movies to study and improve furniture spraying operations.

See also: **9525** (production handbook).

ORE AND MATERIALS BENEFICIATION

10003 Behaviour of Xanthates in Flotation. I. C. H. G. Bushell. *Canadian Mining and Metallurgical Bulletin*, v. 51, no. 551, Mar. 1958, p. 137-149; *Canadian Institute of Mining and Metallurgy, Transactions*, v. 61, 1958, p. 65-77.

Adsorption of xanthate on galena, marmatite, and pyrrhotite. Effects of xanthate concentration and *p*H on flotation.

10004* (Czech.) Effect of Temperature of a Solution of Collector on the Rate of Flotation of Fluorite. **Vliv teploty roztoku sběrače na rychlost flotace fluoritu.** Bohuslav Dobiáš. *Chemické Listy*, v. 52, no. 1, Jan. 1958, p. 1-6.

Study of ϵ-cyclohexenyl caproic acid, N-cetylpyridine bromide and oxidized petroleum at constant pH value. Effect of temperature on mixing and flotation times.

10005* (French.) Conventional Flotation and Floc Flotation. **La flottation classique et la flottation des flocs.** E. Frenay. *Chimie & Industries (Genie Chimique)*, v. 79, no. 2, Feb. 1958, p. 33-43.

A new method consisting in the separation of very fine solids from a pulp or a colloidal solution by embedding a gas (usually air) inside the flocculated solids.

10006 (French.) Conferences on the Agglomeration of Iron Ores, Held at the "Cessid" at Metz, France, on April 27 and 28, 1956. **Collogue sur l'agglomération des minerais de fer tenu au Cessid a Metz les 27 et 28 Avril 1956.** 199 pp. May 1957. l'Institut de Recherches de la Sidérurgie, Saint-Germain-en-Laye, France. (TN520 In8c Over.)

Papers deal with selection of agglomeration processes, recent tendencies in the continuous method; granulometric properties; fuel supply required by the modern process; use of rotary furnace; different experiments in several plants.

10007* (Czech.) Industrial Separation of Tin From Tungsten Concentrates. **Provozní odstraňování cínu z wolframových koncentrátů.** Miloš Karnovský. *Hutník (Czech)*, v. 8, no. 3, Mar. 1958, p. 89-91.

Considers several methods. The best method consists of roasting the W concentrates in a reducing atmosphere with coke and has the following advantages: allows use of W concentrates containing up to 1.5% Sn in production of FeW, uses a large simple rotary tubular furnace, requires minimum service and cost.

10008* (Russian.) Methods of Producing Fluorides. **Puti tekhnologii ftoristykh solei.** M. G. Gabrielova. *Khimicheskaia Nauka i Promyshlennost'*, v. 2, no. 6, 1957, p. 722-726.

Two thermal methods for NaF and KF, and a carbonate method yielding NaF.

10009 Intergranular Comminution by Heating. J. H. Brown, A. M. Gaudin, and C. M. Loeb, Jr. *Mining Engineering*, v. 10; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 212, Apr. 1958, p. 490-496.

Heating a rock prior to crushing it may improve its friability and size distribution of the crushed product.

10010 Upgrading Cobalt-Nickel Stockpiles by the Roast-Flotation Process. M. M. Fine, G. J. Vahrenkamp, A. W. Lankenau, and O. N. Moreland. *U. S. Bureau of Mines Report of Investigations* 5388, Feb. 1958, 10 pp. (TN21 Un3r Vis.)

After a controlled oxidizing roast at 400 C. laboratory flotation with conventional sulfhydric reagents yields an enriched concentrate.

See also: **9192** (beneficiation of phosphate rock); **9256** (separation of uranium); **9709** (sintered Fe ores).

PHYSICS

10011 Acoustical Engineering. Harry F. Olson. 718 pp. 1957. D. Van Nostrand Co., Princeton, N. J. (QC225 OL8ae)

Principles of the generation, transmission, reception, absorption, conversion, detection, reproduction, and control of sound. Includes communications and sound reproducing systems, underwater sound, and ultrasonics.

10012 Experiments on the Influence of Flow on Sound Attenuation in Absorbing Ducts. Erwin Meyer, Fridolin Mechel, and Günther Kurtze. *Acoustical Society of America, Journal*, v. 30, Mar. 1958, p. 165-174.

A decrease of absorption with increasing flow velocity was observed, together with an increase of the frequency of maximum absorption in the case of Helmholtz resonators.

10013 Origin of Ultrasonic Volume Viscosity in Associated Liquids. T. A. Litovitz. *Acoustical Society of America, Journal*, v. 30, Mar. 1958, p. 210-214.

Thermodynamic data on specific heat, and thermal expansion coefficient of glycerol in the liquid and glass state are used to investigate the origin of the ultrasonic volume viscosity losses and associated dispersion.

10014* (English.) **The Absolute Measurement of Light Intensity by a Direct-Reading Thermistor Bolometer.** Gy. Gergely, Gy. Almássy, and J. Ádám. *Acta Physica Academiae Scientiarum Hungaricae*, v. 7, no. 4, 1957, p. 463-467.

10015 (English.) **Reaction of Sound Waves and Its Application for Absolute Measurement of Intensity.** Haakon Olsen, Werner Romberg, and Harald Wergeland. *Acta Polytechnica (Physics Including Nucleonics Series)*, v. 3, no. 16, 1957, 13 pp. (T1 Ac81 Vis.)

A formula is derived for the force exerted by sound waves on a fixed body. The case of a rigid sphere is considered, giving the numerical values necessary to determine the absolute intensity of a sound wave by means of the thrust it imparts to a probing sphere.

10016* (Russian.) Mechanism of Fall of Particles in a Viscous Medium. **O mekhanizme padeniia chastits v viazkoi srede.** A. M. Gasparian and A. A. Zaminian. *Akademiia Nauk Armianskoi SSR, Doklady*, v. 26, no. 1, 1958, p. 39-46.

An attempt to determine the mechanism of restricted fall of a particle. Rejects the assumption that any simultaneous fall of particles (in cases when they affect each other), is a restricted fall. Delayed vs. free fall of a single particle in a viscous stationary medium.

10017 (Russian.) Use of Electron Microscope Shadow Method for Studying the Potential Distribution in p-n-Transitions. **Primenenie tenevoi electronnomikroskopicheskoi metodiki k issledovaniiu raspredelniia potentsiala v p-n-perekhodakh.** V. N. Vertsner and L. N. Malakhov. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 2, Jan. 11, 1958, p. 266-268.

Principal diagram of the method and its application for inspection of the zone of potential drop in Ge p-n-transitions. The width of the zone in tested Ge specimens at 70-80 C did not exceed 20 μ.

10018 (Russian.) Photoelectrets and the Formation of a Latent Electro-Photographic Image. **Fotoelektrety i obrazovanie skrytogo elektrofotograficheskogo izobrazheniia.** V. M. Fridkin. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 2, Jan. 11, 1958, p. 273-276.

Investigation of the photoelectretic condition by the electrophotographic method and the relationship between the phenomenon of constant internal photo-polarization and formation of a latent electro-photographic image.

10019 (Russian.) Secondary Electron Multipliers Recording Long-Wave X-Ray Radiation. **Vtorichnoelektronnye umnozhiteli dlia rezistratsii dlinnovolnovogo rentgenovskogo izlucheniia.** A. M. Tiutikov and A. I. Efremov. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 2, Jan. 11, 1958, p. 286-288.

Selection of the receiver. A secondary electron multiplier of Be bronze with a photocathode of Pt, Au, or Ni form a suitable receiver for the investigations in the region of long-wave X-ray and ultra-violet radiation.

10020* (Russian.) On the Theory of Piezoelectric Transducers. **K teroii p'ezopreobrazovatelei.** K. V. Goncharov. *Akusticheskii Zhurnal*, v. 4, no. 1, Jan.-Mar. 1958, p. 37-46.

Relationships between sensitivity of piezoelectric transducers and their impedance. Production of corresponding frequency characteristics in various types of crystals.

10021* (French.) Calculation of the Optical Constants of Ionic Crystals in the Infra-Red, From the Reflection Spectrum. **Calcul des constantes optiques des cristaux ioniques dans l'infrarouge, a partir du spectre de réflexion.** Florin Abeles and Jean-Paul Mathieu. *Annales de Physique*, v. 3, ser. 13, nos. 1-2, Jan.-Feb. 1958, p. 5-32.

A method independent of all atomic theory was used to obtain the n and k optical constants of ionic crystals in I-R and was applied to NaCl, KCl, TlCl, ZnS, $Pb(NO_3)_2$, calcite (extraordinary ray), and rutile TiO_2 (ordinary ray).

10022* Periodic Boundary Layer Experiments in Liquid Helium. R. J. Donnelly and A. C. Hollis Hallett. *Annals of Physics*, v. 3, Mar. 1958, p. 320-345.

A hydrodynamical study of oscillation experiments in He I and He II, made using the concept of the boundary layer. The hydrodynamical flow of He II changes with amplitude of oscillation.

10023 Quasilinear Heat Flow. N. E. Friedmann. *ASME, Transactions*, v. 80, no. 3, Apr. 1958, p. 635-645.

Influence of variation (with temperature) of thermal conductivity, density, and heat capacity at constant pressure on the solutions of the heat-conduction equation.

10024 Heat Transfer in Liquid Metals. P. S. Lykoudis and Y. S. Touloukian. *ASME, Transactions*, v. 80, no. 3, Apr. 1958, p. 653-666.

Considers the case of a fully developed turbulent flow in cylindrical pipes of constant diameter, the fluid being heated (or cooled) by a constant and uniform heat input at the wall.

10025 Bubble Growth Rates in Boiling. Peter Griffith. *ASME, Transactions*, v. 80, no. 3, Apr. 1958, p. 721-727.

Average growth rate is found to decrease with increasing maximum size and to decrease with increasing pressure. At high pressure, the maximum size of the bubble is independent of pressure and primarily a function of the thickness of the superheated layer near the surface.

10026* (French.) Equations of State and Thermodynamic Properties of Compressed Gases. **Les equations d'etat et les proprietes thermodynamiques des gaz comprimes. III.** Thermodynamic Properties. **Les proprietes thermodynamiques.** J. Saurel. *Chimie & Industrie (Genie Chimique)*, v. 79, no. 2, Feb. 1958, p. 44-51.

Pressure effect on the thermodynamic properties of compressed gases. Internal energy. Specific heat. Enthalpy. Joule-Thomson effect. Application to Nitrogen.

10027* (French.) Effect of Pressure and Temperature on the Bands of the Pure Oxygen Spectrum Between 2400 and 6500 Å. **Effet de pression et de température sur les bandes du spectre de l'oxygèn pur entre 2400 et 6500 Å.** Jean Robin. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 10, Mar. 10, 1958, p. 1530-1533.

The integrated intensity of the bands between 3000 and 6500 Å, at very high pressures, grows more rapidly than the square of the relative density and increases with the temperature. Between 2400 and 3060 Å the triplet structure disappears very rapidly when the temperature increases.

10028* (French.) The Formation of Lithium Within a Crystal of Lithium Fluoride Irradiated by Neutrons. **Mise en évidence de la formation de lithium au sein d'un cristal de fluorure de lithium irradié aux neutrons.** Marianne Lambert and André Guinier. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 11, Mar. 17, 1958, p. 1678-1680.

Lithium was identified in two crystalline forms, cubic body-centered and cubic face-centered. The characteristic diffraction spots disappeared when the LiF was heated above the melting point of Li.

10029 Elements of Heat Transfer. Max Jakob and George A. Hawkins. 3rd Ed. 317 pp. 1957. John Wiley & Sons, New York. (QC320 J21e3)

Basic principles and their applications to simple problems.

10030* (German and English.) Encyclopedia of Physics. **Handbuch der Physik. v. XVI.** Electric Fields and Waves. **Elektrische felder und wellen.** S. Flugge, editor. 753 pp. 1958. Springer-Verlag, Berlin. (QC21 G27h3 Ref.)

Static fields and stationary currents. Quasi-stationary and non-stationary currents in electric circuits. Electromagnetic waveguides and resonators. Propagation, dispersion, and absorption of electromagnetic waves.

10031* (German.) Encyclopedia of Physics. **Handbuch der Physik. v. V. Pt. I.** Principles of Quantum Theory. **Prinzipien der quantentheorie.** S. Flügge, editor. 376 pp. 1958. Springer-Verlag, Berlin. (QC21 G27h3 Ref.)

General principle of wave mechanics. Non-relativistic theory. Relativity mono-body problem. Quantum electrodynamics.

10032* (German.) Paramagnetic Electron Resonance. **Paramagnetische Elektronenresonanz.** Richard Honerjäger. *Fortschritte der Chemischen Forschung*, v. 3, no. 4, 1958, p. 722-737.

Magnetic dipole transition and paramagnetic resonance; mechanism of radiation absorption; widths of lines; classification of substances with a paramagnetic resonance spectrum; Mn^{++} hyperfine structure.

10033 Fiber Optics. N. S. Kapany. *Frontier*, v. 21, no. 1, Spring 1958, p. 18-22.

A well-aligned bundle, or "rope", of glass fibers can be used for the transmission of optical images around corners. In this way, fiber optics has application to medical instrumentation, photography, television, refractometry, and even cryptography.

10034 Fundamentals of Optics. Francis A. Jenkins and Harvey E. White. 3rd Ed. 637 pp. 1957. McGraw-Hill, New York. (QC355 J41f3)

Textbook for advanced undergraduate course covers geometrical, physical, and quantum optics.

10035 (German.) Relationships Between the Coefficients of the Galvano- and Thermomagnetic Transversal Effects in Ferromagnets. **Beziehungen zwischen den Koeffizienten der galvano- und thermomagnetischen Transversaleffekte in Ferromagneten.** G. Busch, F. Hulliger, and R. Jaggi. *Helvetica Physica Acta*, v. 31, no. 1, 1958, p. 3-16.

Two-member formulas were derived for the transversal effects. Field parameters were calculated for Ni. Applications to Fe and Co.

10036 (French.) The Luminescence of CsI and NaI. **Sur la luminescence de CsI et NaI.** H. Enz and J. Rossel. *Helvetica Physica Acta*, v. 31, no. 1, 1958, p. 25-32.

Improved measurements of the decay law and of the temperature dependance of the decay time and luminescent yield were made for two types of scintillations in pure CsI and NaI.

10037 An Introduction to Scale Coordinate Physics. An Introduction to the Formalization of the Macro Operational Point of View. William Bender. 340 pp. 1958. Burgess Publishing Co., Minneapolis. (QC6 B43i Over.)

10038 An Apparatus for Use With Condensed Phases at 10,000°. I. Some Thermodynamic and Rate Considerations at Very High Temperatures. II. H. Tracy Hall, Billings Brown, Bruce Nelson, and Lane A. Compton. *Journal of Physical Chemistry*, v. 62, Mar. 1958, p. 346-351.

10039 Damage to Solids by Liquid Impact at Supersonic Speeds. F. P. Bowden and J. H. Brunton. *Nature*, v. 181, Mar. 29, 1958, p. 873-875.

Deformation of metals and of Perspex was studied with an apparatus capable of attaining impact velocities of 3500 ft./sec.

10040* (German.) The Energy-Quantity Tensor of the Electromagnetic Field in a Moving Dielectric. **Zum Energie-Impulstensor des elektromagnetischen Feldes im bewegten Dielektrikum.** J. I. Horváth. *Nuovo Cimento*, v. 7, ser. 10, no. 5, Mar. 1, 1958, p. 628-635.

10041 Fluorescence and Photoconduction of Silver-Activated Cadmium Sulphide. W. van Gool. *Philips Research Reports*, v. 13, no. 2, Apr. 1958, p. 157-166.

Fluorescence at low temperature shows two bands with maxima at 6200 and 7300 Å. High Ag concentration and low coactivator concentration promote short-wave emission; phosphors with equal concentrations of activator and coactivator show only long-wave emission. Optimal photoconduction and low dark-current are only found with an activator-coactivator ratio slightly greater than one.

10042 Observations on Helical Dislocations in Crystals of Silver Chloride. D. A. Jones and J. W. Mitchell. *Philosophical Magazine*, v. 3, no. 25, Jan. 1958, p. 1-7.

Prismatic and concentric helical prismatic dislocations are generated by the stress field which appears around a spherical glass inclusion in a AgCl crystal when the crystal is cooled from 370 C to room temperature. The properties of these dislocations are described and their origin discussed.

10043 Photosensitors. A Treatise on Photo-Electric Devices and Their Application to Industry. W. Summer. 675 pp. 1957. Chapman & Hall, Ltd., London. (QC715 Su64p)

Characteristics of devices which respond to the action of light; their associated circuits and optical equipment; examples of application to various branches of industry and research.

10044 (English.) **On the Motion of the Boundary Between the Normal and the Superconductive State in a Cylindrical Wire Carrying a Strong Current.** C. J. Gorter and M. L. Potters. *Physica*, v. 24, no. 3, Mar. 1958, p. 169-176.

Inward motion of the boundary was calculated by computing the solution of Maxwell's equations in the normally conductive region.

10045 Theory of Plane Elastic Waves in a Piezoelectric Crystalline Medium and Determination of Elastic and Piezoelectric Constants of Quartz. Issac Koga, Masanao Aruga, and Yōichirō Yoshinaka. *Physical Review*, v. 109, ser. 2, no. 5, Mar. 1, 1958, p. 1467-1473.

10046 Energy Storage in ZnS and ZnCdS Phosphors. Hartmut Kallmann and Eugene Sucov. *Physical Review*, v. 109, ser. 2, no. 5, Mar. 1, 1958, p. 1473-1478.

10047 Dielectric Breakdown of KCl Crystals Irradiated With γ Rays. Yoshio Inuishi and Tokuo Suita. *Physical Review*, v. 109, ser. 2, no. 5, Mar. 1, 1958, p. 1509.

Irradiation with γ-rays causes marked changes in the d.c. dielectric strength of KCl crystals both with and without illumination with visible light, whereas the impulse dielectric strength is not significantly changed.

10048 Microwave Absorption in Methyl Halides. Krishnaji and G. P. Srivastava. *Physical Review*, v. 109, ser. 2, no. 5, Mar. 1, 1958, p. 1560-1563.

Absorption of 3-cm. waves in CH_3Cl and CH_3Br at various temperatures and pressures.

10049 Microwave Spectra of the Tl, In, and Ga Monohalides. A. H. Barrett and M. Mandel. *Physical Review*, v. 109, ser. 2, no. 5, Mar. 1, 1958, p. 1572-1589.

10050 A Method for Deriving the Acoustic Absorption Coefficient of Gases From Measurement of the Decay-Time of a Resonator. P. D. Edmonds and J. Lamb. *Physical Society, Proceedings*, v. 71, Jan. 1058, p. 17-32 + 2 plates.

A unique result for the absorption coefficient is obtained from calculation based on measurement of the decay-time using longitudinal and radial modes of propagation. Expressions are given for the energy losses in the viscous and thermal boundary layers at the walls of the resonator.

10051 Elastic Wave Propagation in a Semi-Infinite Solid Medium. J. W. C. Sherwood. *Physical Society, Proceedings*, v. 71, Feb. 1958, p. 207-219.

A simple physical picture is given of plane waves possessing complex angles of propagation, which paly an important role in the theory of elastic wave radiation.

10052 The Infra-Red Spectrum of Diamond. M. J. Stephen. *Physical Society, Proceedings*, v. 71, Mar. 1958, p. 485-490.

10053 Rheology. Theory and Applications. Frederick R. Eirich, editor. v. II. 591 pp. 1958. Academic Press, New York. (QC189 Ei77r)

Viscoelasticity, relaxation, and experimental methods; rheology of organic glasses, raw elastomers, fibers, gelatin, asphalts, and the earth's interior.

10054 The Spectrum of Atomic Hydrogen. G. W. Series. 87 pp. 1957. Oxford University Press, London. (QC462.H8 Se67s)

Early theories and contemporary experimental work.

10055 The Theory of Relativity. A Re-Examination. H. C. Dudley. 39 pp. 1958. Dudley Associates, Cambria Heights, New York. (QC6 D86t)

Presented as a challenge to those of inquiring mind, based on the neutrino hypothesis. Apparently a somewhat simplified, but very debatable approach.

10056* Industrial Applications of Airborne Ultrasonics. R. M. G. Boucher. *Ultrasonic News*, v. 2, Apr. 1958, p. 8-13.

Acoustic air-borne generators; coagulation of aerosols; acoustic drying; emulsions and dispersions in liquid media; accelerated cleaning and degreasing.

10057* (Russian.) Quantum Phenomena in the Radio Diapason. **Kvantovye iavleniia v radiodiapazone.** V. M. Fain. *Uspekhi Fizicheskikh Nauk*, v. 64, no. 2, Feb. 1958, p. 273-318.

Discusses the problem of quantum effects arising from the interaction between free electrons and H.F. fields. Investigates the possibility of creating a state of coherence within molecules.

10058 (Russian.) Contribution to the Theory of Antiferromagnetism at Low Temperatures. **K. teorii antiferromagnetizma pri nizkikh temperaturakh.** M. I. Kaganov and V. M. Tsukernik. *Zhurnal Eksperimental'noĭ i Teoreticheskoĭ Fiziki*, v. 34, no. 1, Jan. 1958, p. 106-109.

Obtaining the energy spectrum of a uniaxial antiferromagnetic substance without invoking normal magnetization of the spin sublattices in the basic state.

10059 (Russian.) Destruction and Formation of Superconductivity in a Magnetic Field. **O razrushenii i vozniknovenii sverkhprovodimosti v magnitnom pole.** V. L. Ginzburg. *Zhurnal Eksperimental'noĭ i Teoreticheskoĭ Fiziki*, v. 34, no. 1, Jan. 1958, p. 113-125.

Transition from the superconducting state to the normal and vice versa in the presence of an external magnetic field. Calculation of the critical magnetic field strengths corresponding to equilibrium transition and to the boundaries of the super-cooled and superheated regions.

10060* (Russian.) Effect of Inhomogeneities of the Crystal Lattice on the Thermodynamics of a Gas of Quasi-Particles in the Crystal. **Vliianie neodnorodnostei kristallicheskoi reshetki na termodinamiku gaza kvazichastits v kristalle.** M. A. Krivoglaz. *Zhurnal Eksperimental'noĭ i Teoreticheskoĭ Fiziki*, v. 34, no. 2, Feb. 1958, p. 355-370.

Various types of "quasi-particles" interacting among themselves or with static inhomogeneities of the crystal. Derivation of a general formula for the thermodynamic potential, valid for any type of quasi-particle, and an arbitrary law of interaction, by perturbation theory methods assuming that the interaction energy is not large.

10061* (Russian.) Relation Between the Piezo Modulus of Polycrystalline $BaTiO_3$ and Unidirectional Pressure. **Zavisimost' p'ezomodulia polikristallicheskogo $BaTiO_3$ ot odnostoronnego davleniia.** I. A. Izhak and O. A. Shugurov. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 3, Mar. 1958, p. 518-520.

The piezo modulus sharply decreases with increase of pressure. The decrease is approximately inversely proportional to the pressure.

10062* (Russian.) Phase Transitions in a Solid Solution of Calcium Hafnate in Lead Hafnate. **Fazovye perekhody v tverdykh rastvorakh gafnata kal'tsiia v gafnate svintsa.** N. N. Krainik. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 3, Mar. 1958, p. 536-538.

Temperature variation of the dielectric permeability tangent of dielectric loss angle of $(Pb,Ca)HfO_3$.

See also: **9166** (magnetic superviscosity of Ni-Zn ferrites); **9368** (high m.p. materials); **9412** (ultrasonic atomization of liquids); **9496** (piezoelectric crystals); **9589** (thermoluminescent materials).

PLASTICS

10063 (Russian.) Isotopic Exchange Between Gaseous Hydrogen and Solid Polymers Under the Action of Nuclear Radiation. **Ob izotopnom obmene mezhdu gazoobraznym vodorodom i tverdymi polimerami pri deistvii iadernykh izluchenii.** Ia. M. Varshavskii, et al. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 2, Jan. 11, 1958, p. 315-316.

The possibility of introduction of H into polymer molecules during irradiation was studied by means of tracer atoms, using deuterium. Study of the isotopic exchange between gaseous deuterium and the solid polymers, polyethylene, polypropylene, polystyrene, butadiene rubber, and polymethylmethacrylate.

10064 Kinetic Studies of the Reaction of Phenyl Isocyanate With Alcohols in Various Solvents. S. Ephraim, A. E. Woodward, and R. B. Mesrobian. *American Chemical Society, Journal*, v. 80, Mar. 20, 1958, p. 1326-1328.

10065 "Bladder Molding" Forms Smooth Plastic Laminates. J. A. Bagley and F. M. Partridge. *American Machinist*, v. 102, Apr. 7, 1958, p. 102-103.

Technique makes possible molding of glass fiber shell-type laminates having a high ratio of depth to diameter.

10066 Castor Oil Products for Urethane Polymers. *Baker Castor Oil Company. Technical Bulletin No.* 31, 1957, 23 pp. (TP684.C3 B17t Contin.)

Structure and properties of castor oil products; their role in the manufacture of urethane polymers.

10067 The Determination of Moisture Permeation Rate Through Polythene Cable Glands. D. W. Glover and A. J. Cleaver. *British Plastics*, v. 31, Mar. 1958, p. 105-106.

A frost-point method and a method using tritium oxide as radioactive tracer for use on repeaters in submarine telephone cables.

10068 Polycarbonates. *British Plastics*, v. 31, Mar. 1958, p. 112-114.

Preparation, properties, and processing details.

10069 Plastic Chain Coupling Eliminates Lubrication. *Design News*, v. 13, Mar. 31, 1958, p. 22-23.

Nylon coupling exhibits excellent torque capacity and wear resistance and requires no lubrication.

10070 Vacuum-Molded Epoxy Cast-Resin Applications. Howard R. Lucas. *Electrical Manufacturing*, v. 61, Apr. 1958, p. 98-100.

Design of instrument transformers is improved through application of an integrally molded and impregnated epoxy resin insulation structure. Details of a low pressure vacuum-molding technique are given.

10071 Electron Resonance Studies of Occluded Polymer Radicals. D. J. E. Ingram, M. C. R. Symons, and M. G. Townsend. *Faraday Society, Transactions*, v. 54, pt. 3, Mar. 1958, p. 409-415.

Radicals permanently occluded in solid aggregates during polymerization were studied. Acrylonitrile produced a concentration of occluded radicals some hundred-fold greater than methacrylonitrile or methylmethacrylate. No occluded radicals were detected in polystyrene, polyvinyl bromide, or polyvinylidene chloride.

10072 Plastics From Petroleum. K. C. Bryant. *Institute of Petroleum Review*, v. 12, Mar. 1958, p. 92-96.

Polymerization processes and properties of PVC, polystyrene, and polyethylene.

10073 Reinforced Plastics Solve Heat-Strength Problems. J. D. Flynt. *Iron Age*, v. 181, no. 14, Apr. 3, 1958, p. 94-97.

Properties, manufacture, and uses of heat-resistant reinforced plastic laminates.

10074 The Irradiation of Polycaprolactam With γ-Rays and Electrons. T. G. Majury and S. H. Pinner. *Journal of Applied Chemistry*, v. 8, pt. 3, Mar. 1958, p. 168-171.

Samples of unwashed polycaprolactam were irradiated to ascertain whether the ratio of cyclic compounds to linear polymer changes or the polymer is crosslinked or degraded by radiation.

10075 Polymers From Oxa*cyclo*butanes. I. Synthesis and General Properties. A. C. Farthing. **II. The Laboratory-Scale Evaluation of the Polymer From 3:3-Bischloromethyloxa*cyclo*butane.** D. J. H. Sandiford. *Journal of Applied Chemistry*, v. 8, pt. 3, Mar. 1958, p. 186-196.

Monomer syntheses, polymerization kinetics and thermodynamics, and structure-property relationships are reviewed.

10076 Structure of Synthetic High Polymers. Frank C. McGrew. *Journal of Chemical Education*, v. 35, no. 4, Apr. 1958, p. 178-186.

Covalent linkage of monomer units. Molecular size and size distribution; orientation of monomer units; nature of end groups; chain branching; short-chain branching; stereospecificity of monomer combination.

10077 Nature of the Glass Transition and the Glassy State. Julian H. Gibbs and Edmund A. diMarzio. *Journal of Chemical Physics*, v. 28, Mar. 1958, p. 373-383.

The thermodynamic properties of amorphous phases of linear molecular chains are obtained from statistical mechanics by means of a form of the quasi-lattice theory which allows for chain stiffness and the variation of volume with temperature. A second-order transition is predicted for these systems.

10078 The Solution Polymerization of Styrene and Methyl Methacrylate. J. P. Van Hook and A. V. Tobolsky. *Journal of Physical Chemistry*, v. 62, Mar. 1958, p. 257-260.

10079 Molecular Structure and Motion in Irradiated Polyethylene. W. P. Slichter and Elaine R. Mandell. *Journal of Physical Chemistry*, v. 62, Mar. 1958, p. 334-340.

High-energy irradiation inflicts change concurrently upon the crystalline and amorphous regions of polyethylene. Characteristic crystalline spacings become altered with increasing dosage and lattice defects are introduced.

10080* The Surface Tension of Viscous Polymers. Harold Tarkow. *Journal of Polymer Science*, v. 28, Feb. 1958, p. 35-43.

Procedure is based on determination of force necessary to separate two spheres held in contact by the test liquid.

10081* Polymerization of Acrylonitrile by Boron Trifluoride in Amide Solvents. Tod W. Campbell. *Journal of Polymer Science*, v. 28, Feb. 1958, p. 87-96.

Studies of the activity of boron fluoride-dimethyl formamide as a catalyst for the polymerization of acrylonitrile indicate that O is a necessary third component.

10082* Effect of Pile Irradiation on the Dynamic Mechanical Properties of Polyethylene. C. W. Deeley, D. E. Kline, J. A. Sauer, and A. E. Woodward. *Journal of Polymer Science*, v. 28, Feb. 1958, p. 109-120.

10083* Sulfostyrenes. Reactivity Ratios for the Copolymerization of Styrene With Potassium *p*-Vinylbenzenesulfonate and With *p*-Sulfoamidostyrene. Richard H. Wiley and W. A. Trinler. *Journal of Polymer Science*, v. 28, Feb. 1958, p. 163-170.

10084* Vinyl Acetate Emulsion Polymerization. J. T. O'Donnell, R. B. Mesrobian, and A. E. Woodward. *Journal of Polymer Science*, v. 28, Feb. 1958, p. 171-177.

Studies polymerization at 70 C using potassium peroxydisulfate as initiator and a partially hydrolyzed polyvinyl acetate as emulsifying agent.

10085* (German.) The Interreaction Between Polyvinylchloride and Plasticizers. **Über die Wechselwirkung zwischen Polyvinylchlorid und Weichmachern. III.** A. Hartmann. *Kolloid-Zeitschrift*, v. 156, no. 2, Feb. 1958, p. 132-136.

Reports rheologic and dielectric tests on several PVC/plasticizer systems.

10086* (German.) The Self-Association of the Phthalic Acid- and Phosphoric Acid Esters and Their Combined Association With Certain Alkylchlorides. Model Tests for Solving the Problem of the Interaction Between Polyvinylchloride and Plasticizers. **Über die Eigenassoziation von Phthalsäure- und Phosphorsäureestern und deren Mischassoziation mit einigen Alkylchloriden. Modellversuche zur Frage der Wechselwirkung zwischen Polyvinylchlorid und Weichmachern.** A. Hartmann. *Kolloid-Zeitschrift*, v. 156, no. 2, Feb. 1958, p. 136-142.

10087* (Russian.) Compatibility of Nitrocellulose and Butadiene Nitrile Copolymers. **Sovmestimost' nitrotselliulozy s butadiennitril'nymi sopolimerami. IV.** Relaxation Effects of the Binary Mixtures. **Relaksatsionnye svoistva binarnykh smesei.** S. S. Voiutskii, V. I. Alekseenko, and L. E. Kalinina. *Kolloidnyi Zhurnal*, v. 20, no. 1, Jan.-Feb. 1958, p. 20-28.

Investigation of the relaxation process in films of mixtures of nitrocellulose with butadiene nitrile copolymers by means of high mol. wt. plasticizers. A general tendency for increase in relaxation velocity with increase in copolymer content was noted.

10088* (Russian.) Structure and Phase State of Polyethylene-Terephthalate Fibers. **O strukture i fazovom sostoianii volokon iz polietilentereftalata.** V. O. Gorbacheva and N. V. Mikhailov. *Kolloidnyi Zhurnal*, v. 20, no. 1, Jan.-Feb. 1958, p. 38-42 + 1 plate.

Thermographic and X-ray analyses with regard to conditions of preparation and the subsequent stretching and thermal processes. Under the usual conditions of forming from the melt, polyethylene terephthalate easily supercools and hence acquires an amorphous structure. The amorphous state is thermodynamically unstable and crystallization of the polymer takes place at comparatively low temperatures (80-110 C).

10089* (German.) The Interchangeability of PVC Plasticizers. A Contribution to the Problem of Plasticizer Action. **Das Austausch-Verhältnis von PVC-Weichmachern. Ein Beitrag zum Problem der Weichmacher-Wirkung.** Klaus Stoeckhert. *Kunstoffe*, v. 48, no. 3, Mar. 1958, p. 103-105.

Survey of data on plasticizer interchangeability.

10090* (English.) **Electrophoresis of Polyelectrolytes. I. Electrophoretic Study of Poly(vinyl Alcohol).** Masao Hosono and Ichiro Sakurada. **II. Electrophoretic Study of Poly(vinyl Alcohol) Partially Acetalized With Glyoxylic Acid.** Norio Ise, Masao Hosono, and Ichiro Sakurada. *Kyoto University. Memoirs of the Faculty of Engineering*, v. 19, no. 4, Oct. 1957, p. 408-425.

10091 Designer's Guide for Spin-Welding. W. E. Ebeling and A. J. Cheney. *Machine Design*, v. 30, Apr. 17, 1958, p. 128-135.

Process for joining thermoplastics involves rotating one section to be welded against another which is held stationary. Speed and pressure generate frictional heat which melts and fuses the adjacent surfaces.

10092 Machining and Cementing of "Perspex" Materials. *Machinery Lloyd (Overseas Ed.)*, v. 30, no. 7, Mar. 29, 1958, p. 77-80.

Numerous procedures and associated equipment are described for working with polymethyl methocrylate sheets and rods.

10093* (German.) Synthetic Linear Polymers. **Synthetische lineare Polymere. V.** Effect of the Tetraalkyldiaminodiaryl Activators on the Polymerization of the Monomer-Polymer Mixtures of Methylmethacrylate in the Presence of Benzoyl Peroxide. **Die Wirkung der Tetraalkyldiamino-diaryl-Aktivatoren auf die Polymerisation der Monomer-Polymer-Mischungen des Methyl-methacrylates in Anwesenheit von Benzoylperoxyd. VI.** Effect of the Concentration of Initiator Activator Systems on the Speed of Reaction Measured in the Initial State of the Total Polymerization of Methyl Methacrylate. **Die Wirkung der Konzentration von Initiator-Aktivator-Systemen auf die im Anfangsstadium gemessene Bruttoreaktionsgeschwindigkeit bei der Blockpolymerisation von Methylmethacrylat.** I. Géczy and E. Réthy. *Makromolekulare Chemie*, v. 25, no. 3, Feb. 1958, p. 176-198.

10094* Plastics Engineering 1956-1957—A Review of Developments. E. E. McSweeney and R. G. Heiligmann. *Mechanical Engineering*, v. 80, Apr. 1958, p. 57-60.

Major developments include new thermoplastic materials that resist boiling water, progress toward automation in processing, a new technique for controlling the composition range of copolymers, improved fabrication techniques, increased use in large-scale industrial applications, a variety of new products, and the development of valuable engineering data.

10095 Polyethylene Heat-Seal Factors. R. M. Knight, E. E. Froste, and W. U. Funk. *Modern Packaging*, v. 31, no. 8, Apr. 1958, p. 152-156.

Within the possible range of temperature, clamp time, and pressure, any type of film can be satisfactorily sealed.

10096 Hot Subject: Heat Sealing. *Modern Plastics*, v. 35, no. 8, Apr. 1958, p. 85 + 7 pages.

Technical advances in electronic welding in vinyl film and sheet.

10097 Molding Linear Polyethylene. Albert Spaak and Clifford L. Weir. *Modern Plastics*, v. 35, no. 8, Apr. 1958, p. 122 + 4 pages.

Recommended for best results: differential cooling of mold cavity areas to get uniform cooling times; generous sprues, runners, and gates; high filling rates (pre-plasticator helps); melt temperatures between 375 and 550 F.

10098 Polycarbonate Resin. R. J. Thompson and K. B. Goldblum. *Modern Plastics*, v. 35, no. 8, Apr. 1958, p. 131 + 7 pages.

Manufacture, processing, properties, and applications of a tough, heat-resistant, dimensionally stable thermoplastic.

10099 Electrical Properties of Modified Epoxy Resins. John Delmonte. *Modern Plastics*, v. 35, no. 8, Apr. 1958, p. 151 + 3 pages.

Addition of polyethylene glycols to dodecenyl succinic anhydride-epoxy systems increases the mole ratio of the anhydride to epoxy needed for optimum properties.

10100* New Techniques in Dyeing Acrilan. Walter H. Hindle. *Modern Textiles Magazine*, v. 39, Apr. 1958, p. 54 + 1 page.

10101 Graft Copolymers—A New Technology? Donald J. Metz. *Nucleonics*, v. 16, Apr. 1958, p. 73-77.

Better ion-exchange membranes, stronger plastics, and better dielectrics are new materials from study of radiation in organics, particularly graft copolymerization.

10102 Deformation Processes in Polyethylene Interpreted in Terms of Crystal Plasticity. F. C. Frank, A. Keller, and A. O'Connor. *Philosophical Magazine*, v. 3, no. 25, Jan. 1958, p. 64-74 + 2 plates.

The rolling texture of drawn polythene is interpreted in terms of slip and twinning processes characteristics of ordinary crystal plasticity in combination with the rubbery elasticity characteristic of macromolecular amorphous substances.

10103* (Dutch.) New Developments in the Field of Polyethylene and Polystyrene. **De nieuwe ontwikkelingen op het gebied van polyaetheen en polystyreen.** J. van Leeuwen. *Plastica*, v. 11, no. 3, Mar. 1958, p. 193-198.

Available types of polyethylene. Differences in their physical and physico-chemical structure. Properties as function of degree of crystallization and extent of branching. Density and crystallinity. Increasing mol. wt. and decrease of flow.

10104 Progress With Fibre-Resin Preform Mouldings. *Plastics (London)*, v. 23, Mar. 1958, p. 79-81.

Method of manufacture. Advantages, including strength characteristics and faster cure times.

10105 Plastics Shutters. J. V. Eurich. *Plastics (London)*, v. 23, Mar. 1958, p. 92.

A technique for forming flexible shutters from polythene sheet material.

10106 Plastics in the Laboratory. I. G. Haim. *Plastics (London)*, v. 23, Mar. 1958, p. 107-109.

A discussion of various laboratory items made from plastic materials. (To be continued.)

10107 Laminates for Space Flight. Thomas A. Dickinson. *Plastics (London)*, v. 23, Mar. 1958, p. 110.

Production and properties of Astrolite, consisting of glass fabric laminae bonded by a phenolic resin, and resistant to temperatures up to 5000 F.

10108 The New Diakons. *Plastics (London)*, v. 23, Apr. 1958, p. 117-121.

Use of new grades of Diakon for injection molding and extrusion; properties and applications.

10109 Importance of Fabrication on the Properties of Silicone-Glass Laminates. E. C. Elliott and K. R. Hoffman. *Plastics Technology*, v. 4, Mar. 1958, p. 235-239.

Deals with variations in laminate properties caused by washed vs. unwashed glass fabric; cloth tensile strength; catalyst concentration; pre-cure time and temperature; resin content; fabric orientation; molding method, pressure, and temperature; post-cure time; laminate thickness.

10110 Picking the Plastic for Abrasion Resistance. Jean Pierre Abbat. *Product Engineering*, v. 29, no. 13, Mar. 31, 1958, p. 105-107.

Characteristics of elastomers and rigid plastics that resist best.

10111* (Polish.) Utilization of Nuclear Radiation in the Plastics Industry. **Zastosowanie promieniowania jadrowego w dziedzinie tworzyw sztucznych.** Stanislaw Porejko and Zbigniew Brzozowski. *Przemysł Chemiczny*, v. 37, no. 1, Jan. 1958, p. 8-11.

Different types of radiation and effects on plastics; effect of nuclear radiation on monomers. Rate of polymerization of different polymers as a function of γ intensity. Degradation.

10112* (Polish.) Some Reactions of Diepoxy and Epoxy Resins With Diphenols and Phenol-Formaldehyde Resins. **O reakcjach niektórych zwiazków dwuepoksy i żwyic epoksydowych z dwufenolami i żywicami fenoloformaldehydowymi.** Stanisław Penczek. *Przemysł Chemiczny*, v. 37, no. 1, Jan. 1958, p. 35-38.

Hardening was determined by the reaction between the phenol and epoxy groups. New types of linear polyethers of high mol. wt. in addition reaction from diepoxy compounds and diphenols.

10113* Compounding of Polyvinyl Chloride. I-II. Mixing, Extrusion, Injection Moulding. M. S. Welling. *Rubber Journal and International Plastics*, v. 134, no. 11, Mar. 15, 1958, p. 408 + 2 pages; Mar. 22, 1958, p. 453-455.

Details of the dry powder mixing technique. (To be continued.)

10114* (French.) Isopolymers Derived From Polyacrylyl Chloride. **Isopolymères dérivés du chlorure de polyacrylyle.** S. Boyer and A. Rondeau. *Société Chimique de France, Bulletin*, 1958, no. 2, Feb., p. 240-244.

Comparison of the effects of certain substitutions on the chemical, physical, and mechanical properties of polymers and copolymers. "Isopolymers" were prepared having the same average molecular mass, the same molecular mass distribution, and the same system of monomer links.

10115* (French.) Preparation and Polycondensation of a ω-Aminoacid With a Lateral Ethylene Chain: N-Allyl-Amino-11 Undecanoic Acid. **Préparation et polycondensation d'un ω-aminoacid à chaîne latérale éthylénique: l'acide N-allyl amino-11 undécanoïque.** Georges Champetier and Michel Lavalou. *Société Chimique de France, Bulletin*, 1958, no. 2, Feb., p. 261-263.

The acid was prepared by the action of the allylamine on the bromo-11-undecanoic acid. Its polycondensation yields a polyamide with ethylene side chains able to reticulate by means of double bonds. Properties of the obtained polymer.

10116* Creep in Polyethylene at Elevated Temperatures. R. R. Dixon. *SPE Journal*, v. 14, Apr. 1958, p. 23 + 2 pages.

Creep values were measured in tension at several temperatures and loadings.

10117* "Delrin"—A New Thermoplastic. J. F. Cogdell and R. H. Hardesty. *SPE Journal*, v. 14, Apr. 1958, p. 25 + 12 pages.

New polymer, consisting of repeating $-CH_2O-$ groups, has high strength, excellent flexural modulus and fatigue life, outstanding resilience and toughness and retains many of its end-use properties, including dimensional stability, under high temperature and humidity for extended periods of stress or during exposure to most solvents.

10118* (Czech.) Plastics Are Replacing Metals. **Plastické hmoty nahrazují kov.** F. Rybář. *Strojírenská Výroba*, v. 6, no. 3, Mar. 1958, p. 105-108.

Possibilities of using plastic materials in machine construction where, up to now, only metals were used. Utilization of polyamides, polyethylene, and teflon.

10119 Effects of Gamma Radiation on Linear Polyethylene. William B. Terrell and Jack T. Humphries. *U. S. Air Force. Wright Air Development Center. WADC Technical Report* 56-515, Feb. 1958, 39 pp. (TL507 Un3.18w Vis.)

Tensile strength, elongation, hardness, impact strength, specific gravity, water absorption, heat distortion temperature, dielectric constant, arc resistance, color, and infra-red absorption were measured as functions of total radiation dosage up to 10^9 roentgens.

10120 Mechanical Properties of Plastic Laminates. Gordon H. Stevens. *U. S. Forest Products Laboratory Report No.* 1820-D, Jan. 1958, 14 pp. (TS800 Un3.3r Contin.)

Data from tension, compression, and bending tests of a parallel-laminated silicone laminate reinforced with 181 glass fabric.

10121* Radio-Active Rains. R. L. Morris. *Water & Sewage Works*, v. 105, Mar. 1958, p. 92-94.

Analyses made following rains showed a sharp increase in radioactivity of surface waters following ten significant rains, which were preceded by above normal air activity levels.

10122* (Russian.) Some Cases of Difficult Polymerization of Monomers of the Arylmethacrylate Series. **Sluchai zatrydn**

ennoi polimerizatsii monomerov riada arilmetakrilatov. M. M. Koton, T. A. Sokolova, M. N. Savitskaia, and T. M. Kiseleva. *Zhurnal Obshchei Khimii*, v. 28, no. 2, Feb. 1958, p. 417-421.

The presence of a steric hindrance in the monomer molecule may explain the difficult polymerization. The methacrylate ethers of *m*-cresol, guaiacol, *m*-methoxyphenol, *o*-oxybiphenyl, thymol, and menthol were synthesized.

10123 Crosslinking Efficiencies in the Methyl Methacrylate-Ethylene Dimethacrylate and Ethyl Methacrylate-Ethylene Dimethacrylate Systems. Degradative Analysis by Electron Irradiation. Allan R. Shultz. *American Chemical Society, Journal*, v. 80, Apr. 20, 1958, p. 1854-1860.

10124 Diffusion in Ethylene Polymers. III. Effects of Temperature and Pressure. David W. McCall and W. P. Slichter. *American Chemical Society, Journal*, v. 80, Apr. 20, 1958, p. 1861-1868.

10125* Some Thermodynamic and Kinetic Aspects of Addition Polymerisation. F. S. Dainton and K. J. Ivin. *Chemical Society, Quarterly Reviews*, v. 12, no. 1, 1958, p. 61-91.

10126* Solution and Fractionation Properties of Graft Polymers. R. W. Kilb and A. M. Bueche. *Journal of Polymer Science*, v. 28, Mar. 1958, p. 285-294.

Solubility is critically dependent on the heat of interaction of the various components of the polymers with the solvent; precipitates from fractionations of graft polymer solutions are no longer simple functions of the over-all mol. wt.

10127* Formation of Block Polymers of Butyl Acrylate With Styrene and Vinyl Pyridine. B. Lionel Funt and Edward Collins. *Journal of Polymer Science*, v. 28, Mar. 1958, p. 359-364.

10128* Graft Copolymers: Synthesis and Characterization. V. E. Shashoua and K. E. Van Holde. *Journal of Polymer Science*, v. 28, Mar. 1958, p. 395-411.

True 100% grafted polymers were prepared in a two-stage emulsion polymerization process. Microgels of styrene crosslinked with divinylbenzene, methyl acrylate crosslinked with divinylbenzene, and acrylonitrile crosslinked with methylenebisacrylamide were used as first stage polymers, and the grafting of styrene and acrylonitrile were studied.

10129* (German.) High Capacity Plant for the Impregnation of Paper With Synthetic Resin. **Hochleistungs-Anlage zum Imprägnieren von Papierbahnen mit Kunstharz.** W. Gutenberger. *Kunststoffe*, v. 48, Apr. 1958, p. 159-160.

Construction and operation of a modern high-capacity coating and impregnating plant, especially suitable for the impregnation of absorbent papers with thermosetting synthetic resins. Economical cycle of operation.

10130 Extrusion and Forming of High-Density Polyethylene Blown Tubing. Robert Doyle. *Modern Plastics*, v. 35, no. 9, May 1958, p. 137 + 3 pages.

Processing equipment, techniques, and conditions for high-quality products. Tables show the variations in strength properties of blown tubing with sheet thickness and blow-up ratio, and dependence of cycle times on sheet thickness.

10131 Polyesters of Dimer Acids as Intermediates for Urethane Foams. R. D. Aylesworth, R. H. Boehringer, D. T. Moore, and M. H. Smith. *Modern Plastics*, v. 35, no. 9, May 1958, p. 145 + 5 pages.

Methods of polyester and flexible foam preparation for a urethane system based on polyesters of dimer acids. Optimum foams simulate foamed rubber in all important respects, but afford greater versatility, lower densities, "in situ" foaming potential, and excellent adhesion to various surfaces.

10132 Kaolinite Fractions, Their Effect on Physical Properties of Reinforced Plastics. G. P. Larson. *Modern Plastics*, v. 35, no. 9, May 1958, p. 157 + 7 pages.

Every physical property tested, except impact strength, was significantly improved by addition of kaolinite to reinforced diallyl phthalate plastic.

10133 Crystallinity Changes in Irradiated Polyethylenes. A. Charlesby and L. Callaghan. *Physics and Chemistry of Solids*, v. 4, no. 4, 1958, p. 306-314.

Crystallite destruction was followed by specific volume measurements. Pile radiation is more effective than electrons.

10134* (German.) The Suitability for Vacuum Forming of Mixtures Consisting of Polyvinyl Chloride and Vinyl Acetate Copolymers. **Die Eignung von Gemischen aus Polyvinylchlorid und Vinylazetat-Mischpolymerisaten für die Vakuumverformung.** H. Luttropp. *Plaste und Kautschuk*, v. 5, no. 3, Mar. 1958, p. 87-93.

Basic principles, development, and application of vacuum working; materials used and their physical properties.

10135* (German.) The Change in the Dispersion of PVC Particles in Plasticizers. **Über die Änderung des Dispersionszustandes von PVC-Teilchen in Weichmachern.** A. Kratochvíl and J. Špirit. *Plaste und Kautschuk*, v. 5, no. 3, Mar. 1958, p. 93-96.

Refractometric method is used to study the interaction between PVC and plasticizers in dipping, coating, and casting.

10136* (Dutch.) New Developments in the Field of Polyethylene and Polystyrene. **De nieuwe ontwikkelingen op het gebied van polyaetheen en polystyreen.** J. van Leeuwen. *Plastica*, v. 11, no. 4, Apr. 1958, p. 272-277.

High density yields a gain in stiffness, and higher hardness, gloss, and softening. Yield stresses are better and impact resistance is worse. Low melt-index gives better properties in use but processing is more difficult.

10137* Micro-Study of Structure of Crazed Plastics. *Plastics Industry*, v. 16, Apr. 1958, p. 20-22.

Optical study of plastics exposed to stress, or to stress and solvent combined.

10138* Water-Soluble Resins. *Plastics Industry*, v. 16, Apr. 1958, p. 30-33.

"Polyox" resins can be cast, calendered, or extruded into tough, inherently flexible films. Their solubility in water, resistance to biological attack, resistance to oils and greases, low moisture pickup in dry form, and compatibility with other types of polymers such as starch and polyvinyl acetate suggest many applications.

10139 Use of Radiation Gases in Plastics Extrusion. G. L. Doering. *Plastics Technology*, v. 4, Apr. 1958, p. 344 + 4 pages.

Source-detector units provide a simple read-out system that controls production, improves extrusion quality, and reduces costs of processing.

10140 The Thirty Years of Plastics Impact Testing. II. R. F. Westover. *Plastics Technology*, v. 4, Apr. 1958, p. 348-352.

Reviews 40 references on past accomplishments and the present status of impact testing, and the outlook for the future.

10141 Polyurethanes. Bernard A. Dombrow. 176 pp. 1957. Reinhold Publishing Corp., New York. (TS1940 D71p)

The chemistry of polyurethanes and facts relating to their applications as foams, coatings, rubbers, and adhesives, also textile applications.

10142 Progress in Plastics. Papers and Discussions at the British Plastics Convention, 1957. Phillip Morgan, editor. 394 pp. 1958. Philosophical Library, New York. (TP986 P69 Vis.)

These 18 papers represent some of the most recent international advances in plastics technology, particularly in the fields of polythenes, vinyls, polystyrenes, reinforced plastics, and fluorine polymers. Current developments in the theory and practice of extrusion and injection molding are also included.

10143 Effects of TDI Isomer Ratio in Polyurethane Foams. G. T. Gmitter and E. E. Gruber. *Rubber Age*, v. 83, no. 1, Apr. 1958, p. 83-87.

Data indicate that mixtures containing 2,4- and 2,6-toluene diisocyanate in ratios between 83/17 and 87/13 should provide foams with a higher degree of optimum properties, both physical and processing.

10144 PVC Pastes. Spread-Coating of Fabrics. M. S. Welling. *Rubber Journal and International Plastics*, v. 134, no. 17, Apr. 26, 1958, p. 641 + 3 pages.

Preparation, properties, and uses of PVC pastes and foam.

10145* (Russian.) Crystallization of Elastic Polymer Molecules. **Kristallizatsiia gibkikh polimernykh molekul.** L. Mandel'kern. *Uspekhi Khimii*, v. 27, no. 2, Feb. 1958, p. 193-239.

Structure of crystalline polymers. Thermodynamics of crystallization. Melting copolymers. Polymorphism. Effect of hydrostatic pressure. Crystallization from dilute and moderately concentrated solutions.

10146* The Testing of Polyvinylchloride Electrical Formulations. George W. Ashworth, Joseph R. Darby, William E. Koerner, and Ralph H. Munch. *Wire and Wire Products*, v. 33, Apr. 1958, p. 407 + 6 pages.

A novel molded specimen for studying the long-term water immersion resistivity of PVC electrical insulating compounds permits determining the quality of ingredients at less cost, material, equipment, and much less space.

See also: **9227** (determination of hydroxyl groups in epoxy resins); **9279** (ethylene polymerization with $TiCl_4$); **9290** (Br and linear paraffin chains); **9322** (hydration of hydrophylic polymers); **9349** (double bond formation by irradiation); **9367** (light scattering and mol. wt. in polyamides); **9396** (vapor transfer through barriers); **10214** (resins for textiles); **10219** (polyethylene films for paper).

POLLUTION AND WASTES

10147* Toxicologic Methods for Establishing Drinking Water Standards. Herbert E. Stokinger and Richard L. Woodward. *American Water Works Association, Journal*, v. 50, Apr. 1958, p. 515-529.

10148* Deposition of Dust Particles From Industrial Stacks. G. T. Csanady. *Australian Journal of Applied Science*, v. 9, no. 1, Mar. 1958, p. 1-8.

New concepts are introduced and the characteristic features of instantaneous fall of dust are discussed. Averaging deposition rates for wind speed and direction is then considered and it is shown how the weather data generally available can be utilized.

10149 Industrial Air Pollution. E. R. Hendrickson. *Florida University. Engineering and Industrial Experiment Station. Leaflet Series No.* 95, Oct. 1957, 10 pp. (TA1 F66L Contin.)

10150 Smog Chamber Studies of Unleaded vs. Leaded Fuels. F. V. Morriss, Calvin Bolze, and John T. Goodwin, Jr. *Industrial and Engineering Chemistry*, v. 50, Apr. 1958, p. 673-676.

Neither tetraethyllead nor halogen-containing scavengers of lead have any detectable effect on the smog-forming potential of automobile exhaust.

10151* Present Treatment Practice of Kraft Mills on Air-Borne Effluents. Nicholas J. Lardieri. *Paper Trade Journal*, v. 142, Apr. 14, 1958, p. 28-33.

10152* (Italian.) Measurements of the Radioactivity of the Air. **Misure della radioattività dell'aria.** Lino Daddi, Luciano De Franceschi, Giancarlo Del Corso, and Lionello Michelassi. *Ricerca Scientifica*, v. 27, no. 11, Nov. 1957, p. 3313-3322.

Natural and artificial radioactivity was measured by the filtration of a known volume of normal air by paper filters with successive measurements of their β activity by means of a thin window Geiger counter.

10153* Radioactive Waste Discharges From Nuclear Reactors. James G. Terrill, Jr. *Sewage and Industrial Wastes*, v. 30, Mar. 1958, p. 270-282.

10154* Chemical Recovery From Neutral Sulphite Semi-chemical Spent Liquors by the Atomized Suspension Technique. G. Lee and W. H. Gauvin. *Tappi*, v. 41, Mar. 1958, p. 110-116.

Finely-divided droplets of liquor are entrained down the tower by the water vapor atmosphere in which they are suspended, and pass through successive zones of evaporation, drying, and thermal decomposition.

10155 The Occurrence and Distribution of Radioactive Non-Fission Products in Plants and Animals of the Pacific Proving Ground. Frank G. Lowman, Ralph F. Palumbo, and Dorothy J. South. *U. S. Atomic Energy Commission, UWFL-51*, June 12, 1957, 61 pp. (UF767 Un3.1uw Contin.)

In addition to radioactive fission products, the non-fission radioisotopes, Mn^{54}, Fe^{55}, Fe^{59}, Co^{57}, Co^{58}, Co^{60}, and Zn^{65} also were identified in some samples. The latter isotopes accounted for almost all of the radioactivity in the zoological samples of marine origin.

10156* Synthetic Detergents. Continuing Research Related to Water and Sewage Treatment. H. V. Moss. *Water and Water Engineering*, v. 2, Mar. 1958, p. 116-119.

Alkylbenzenesulfonate in concentrations now present in sewage does not affect bacterial life nor otherwise significantly affect efficiency of operation of a sewage plant. Methods of controlling frothing, effect of phosphates on water treatment, and methods of analysis for alkylbenzene and phosphates in water and sewage are currently under investigation.

10157* Chemical Coagulation Studies on Removal of Radioactivity in Waters. Lloyd R. Setter and Helen H. Russell. *American Water Works Association, Journal*, v. 50, May 1958, p. 590-602.

The laboratory jar tests with chemicals and dosages used in conventional water treatment practice indicate that all of the suspended β activity and part of the soluble β activity is removed. The longer the activity has been subjected to natural purification (adsorption on surfaces, sedimentation, or percolation), the more difficult it is to remove the remaining soluble activity by coagulation.

10158* Control of Oxides of Nitrogen in Automobile Exhaust Gases. Ralph W. Bishop and George J. Nebel. *Archives of Industrial Health*, v. 17, no. 5, May 1958, p. 511-518.

Oxides of N are greatly reduced by the use of a "maximum performance carburetor". Such a carburetor provides rich air-fuel mixtures at all driving conditions. This marked reduction must be paid for by a sacrifice in fuel economy.

10159 Accidental Dispersion of Reactor Poisons and the Controlled Distance Required. R. L. Menegus and H. F. Ring. *U. S. Atomic Energy Commission, DP-105* (Rev. 2), Mar. 1958, 40 pp. (UF767 Un3.1dp Contin.)

Two types of hypothetical reactor catastrophe are considered. In the first of these, the "Boiling Accident", it is assumed that a fraction of the radioactive material in a reactor is released to the atmosphere at a steady rate over a period of hours. In the second, the "Puff Accident", it is assumed that the release of the radioactive material takes place "instantaneously".

10160 Laboratory Studies on the Ground Disposal of ORNL Intermediate-Level Liquid Radioactive Wastes. Richard L. Blanchard, Bernd Kahn, and Gordon G. Robeck. *U. S. Atomic Energy Commission, ORNL-2475*, Apr. 11, 1958, 35 pp. (UF767 U3o Contin.)

Cesium-137 was adsorbed very effectively in columns of Conasauga shale with a shale/solution distribution ratio of 500.

See also: **9637** (cascade impactor); **9736** (pickle liquor treatment); **9931** (fission product disposal and temperature distribution in a clay block).

RUBBER AND ELASTOMERS

10161 Some Properties of Polymer Networks Forced From Oriented Chains of Natural Rubber. D. E. Roberts and L. Mandelkern. *American Chemical Society, Journal*, v. 80, Mar. 20, 1958, p. 1289-1297.

Swelling behavior, isotropic length, and isotropic melting temperature of the networks depend not only on the fraction of units cross-linked but also very markedly on the arrangement of the chains prior to network formation. Crystalline oriented racked rubber was cross-linked twice as effectively by γ-radiation as was amorphous rubber.

10162 Special Electrode Holder Overcomes Coating Problems. William C. Clarke. *Chemical Processing*, v. 21, Apr. 1958, p. 134-137.

Formation of a large mass covering both electrodes in synthetic rubber coagulation was prevented by use of an acrylic plastic electrode holder from which only tips of the electrodes protrude.

10163 The Commercial Production of GR-S. K. G. Burridge. *Institute of Petroleum Review*, v. 12, Mar. 1958, p. 96-101.

Manufacture, properties, and uses of butadiene-styrene copolymers.

10164 Elastomer Seals Hot Fluids. *Iron Age*, v. 181, no. 15, Apr. 10, 1958, p. 103.

Viton, a copolymer of vinylidene fluoride and hexafluoropropylene, stands 500 F immersed in Mil-L-7808 lubricant.

10165* The Determination of the Stiffness of the Chain of a Rubber-Like Polymer. Richard S. Stein. *Journal of Polymer Science*, v. 28, Feb. 1958, p. 83-86.

Theory for the infra-red dichroism of a crosslinked, rubber-like amorphous polymer. The dichroism-stress ratio is independent of strain and degree of crosslinking and serves as a measure of the number of monomer units per statistical segment, an index of chain stiffness.

10166* A Diffusivity Approach for Studying Polymer Structure. I. Auerbach, W. R. Miller, W. C. Kuryla, and S. D. Gehman. *Journal of Polymer Science*, v. 28, Feb. 1958, p. 129-150.

Study of the diffusion in polymers of molecules comparable in size and structure to the segments of the chain molecules is suggested as a means of securing information on structure and molecular friction forces in polymers. A method using C-14 was used.

10167* Copolymers of Butadiene and Unsaturated Acids: Crosslinking by Metal Oxides. W. Cooper. *Journal of Polymer Science*, v. 28, Feb. 1958, p. 195-206.

Low mol. wt. butadiene copolymers containing combined acid groups react with metal oxides to give products with unusual properties. The salts, particularly the Zn and Cd compounds, exhibit plastic flow under slowly applied stresses, but are highly elastic on sharp impact.

10168* (Russian.) High Styrene Divinyl Copolymers. **Sopolimery divinila s vysokim soderzhaniem stirola.** I. I. Radchenko and S. L. Fisher. *Kauchuk i Rezina*, v. 17, no. 1, Jan. 1958, p. 3-9.

Preparation and properties of these elastomers.

10169* (Russian.) Investigation of the Process of Rapid Mixing in the 3A Rubber-Mixer. **Issledovanie protsessa skorostnogo smesheniia v rezinosmesitele 3A.** K. D. Bebris, N. V. Veresotskaia, A. N. Zherebtsov, and M. I. Novikov. *Kauchuk i Rezina*, v. 17, no. 1, Jan. 1958, p. 13-20.

Study of technological factors affecting the process.

10170* (Russian.) Formation and Properties of Interpolymers of Natural and Butadiene-Styrene Rubbers. **Poluchenie i svoistva mezhpolimerov natural'nogo i butadienstirol'nogo kauchukov.** B. A. Dogadkin, V. N. Kuleznev, and Z. N. Tarasova. *Kolloidnyi Zhurnal*, v. 20, no. 1, Jan.-Feb. 1958, p. 43-51.

Joint rolling of natural and butadiene-styrene rubbers on a cold mill leads to the formation of an interpolymer containing 30% of natural rubber. The interpolymer can be vulcanized by polychloro compounds and can undergo thermooxidative change of structure. The interpolymers show higher characteristic viscosity than mixtures of identical composition, but separately rolled. An adhesive film of the interpolymer significantly increases the bonding strength between incompatible polymers.

10171* (Russian.) Investigation of the Coagulation of Rubber Latexes by Means of Radioactive Isotopes. **Issledovanie koaguliatsii kauchukovykh lateksov pri pomoshchi radioaktivnykh izotopov.** D. M. Sandomirskii and M. K. Vdovchenkova. *Kolloidnyi Zhurnal*, v. 20, no. 1, Jan.-Feb. 1958, p. 80-83.

Method for determination of the latex stability with the aid of $Ca^{45}Cl_2$. The number of milliequivalents of Ca combining with 1g. of rubber on coagulation is independent of the concentrations of the latex and coagulating solution, decreases on dialysis and during natural or accelerated aging of the rubber, and increases on addition of protective substances to the latex.

10172 Ground Rules for Molded Silicone Rubber Parts. D. P. Spalding. *Product Engineering*, v. 29, no. 15, Apr. 14, 1958, p. 69-71.

Tips on curing methods, shape of part and other variables that determine satisfactory service.

10173 The Mechanism of Friction of Rubber. S. B. Ratner. *Rubber Journal and International Plastics*, v. 134, no. 13, Mar. 29, 1958, p. 486 + 1 page. (Translated from *Kolloidnyi Zhurnal*, v. 19, no. 3, 1957, p. 394-396.)

10174 Determination of Copper and Arsenic in Carbon Blacks. R. R. Gibbs and F. Moore. *Rubber Journal and International Plastics*, v. 134, no. 14, Apr. 5, 1958, p. 524-525.

10175 Further Developments in the "Vulkollan" Field. Erwin Müller. *Rubber and Plastics Age*, v. 39, Mar. 1958, p. 195 + 5 pages.

Preparation, processing, and properties of various "Vulkollan" type materials.

10176 Annual Report on the Progress of Rubber Technology. T. J. Drakeley, editor. v. XXI. 134 pp. 1957. W. Heffer & Sons, Ltd., Cambridge, England. (TS1870 I8an Vis.)

Includes 23 papers on the production, chemistry, physics, properties, testing, and uses of rubber.

10177 Conductive Rubber: Its Production, Application and Test Methods. R. H. Norman. 99 pp. 1957. Maclaren & Sons, Ltd., London. (TS1890 N78c)

10178 Cross Linking of Butadiene-Acrylate Polymers by Alkaline Earth Hydroxides. W. Cooper and T. B. Bird. *Industrial and Engineering Chemistry*, v. 50, May 1958, p. 771-776.

High-strength elastomers are obtained without reinforcing agents, suitable for hose, seals, and gaskets.

10179 Control of Degradation in Oil-Extended Styrene-Butadiene Rubber. R. J. Reynolds. *Industrial and Engineering Chemistry*, v. 50, May 1958, p. 785-792.

Small amounts of inexpensive Mg soaps impart improved stability to oil-extended cold rubber made by conventional iron-activated polymerization recipes.

10180* Graft Interpolymers Formed by γ-Irradiation of Methyl Methacrylate-Natural Rubber Mixtures. D. J. Angier and D. T. Turner. *Journal of Polymer Science*, v. 28, Mar. 1958, p. 265-274.

On exposure to Co-60 radiation, mixtures of natural rubber and methyl methacrylate yield almost exclusively rubber-polymethyl methacrylate graft polymers. Influence of several variables are reported.

10181* (French.) A Few Physiological Aspects in the Study of Latex. **Quelques aspects physiologiques de l'étude du latex.** L. K. Wiersum. *Revue Générale du Caoutchouc*, v. 35, no. 3, Mar. 1958, p. 276-280.

The stimulation of rubber yields in the far East. Impact upon the inner activity of the trees. Biological importance of latex in rubber-producing plants. Experiments on the physiology of stimulation.

10182* (French.) Development and Control of Tackiness in Vulcanized Rubber. **Le tournage au gras du caoutchouc vulcanisé et la protection contre ce phénomène.** J. C. Danjard, L. Toullec, and A. Langlade. *Revue Générale du Caoutchouc*, v. 35, no. 3, Mar. 1958, p. 305-308.

Accurate reproduction of tackiness in vulcanized rubber. Explaining the mechanism of the type of degradation.

10183* (French.) Polymerization Techniques. **Techniques de polymérisation.** V. Sinn. *Revue Générale du Caoutchouc*, v. 35, no. 3, Mar. 1958, p. 310-311.

Determination of the rate of conversion of synthetic rubber by dilatometric methods.

10184 Continuous Curing of Neoprene Extrusions. M. A. Schoenbeck. *Rubber Age*, v. 83, no. 1, Apr. 1958, p. 88-92.

Neoprene extrusions can be vulcanized continuously on a

practical basis in a liquid curing medium at temperatures of 400 to 600 F. Equipment, procedures, and applications are outlined.

10185 Low Cost Compounding With Oil-Extended Rubber. Z. J. Dorko and H. A. Pfisterer. *Rubber Age*, v. 83, no. 1, Apr. 1958, p. 105-111.

A detailed compounding study of two Polysar elastomers with recipes for stocks to meet specific applications.

10186 Evaluations of Mercaptobenzimidazole and Its Zinc Salt. N. C. H. Humphreys and F. Moore. *Rubber Journal and International Plastics*, v. 134, no. 17, Apr. 26, 1958, p. 633 + 3 pages.

Mercaptobenzimidazole and its Zn salt are shown to be good Cu inhibitors and to have interesting general antioxidant properties where freedom from scorch and relatively non-staining effects are desirable.

10187* Low-Temperature Properties of 80% Cis-Polybutadiene. H. E. Railsback and Q. L. Morris. *Rubber World*, v. 138, no. 1, Apr. 1958, p. 75 + 6 pages.

This rubber should be serviceable to a much lower temperature than natural rubber, styrene-butadiene cold rubber, or emulsion polybutadiene.

10188* Du Pont LCM Continuous Curing of Neoprene Extrusions. *Rubber World*, v. 138, no. 1, Apr. 1958, p. 81-84.

Method employs a liquid curing medium (LCM) of either molten metal or oil maintained at an extremely high temperature; relatively complicated cross-sections have been successfully cured in 20 sec.

10189* (Russian.) Mechanical - Chemical Transformations and Synthesis of Polymers. **Mekhano-khimicheskie prevrashcheniia i sintez polimerov.** A. A. Berlin. *Uspekhi Khimii*, v. 27, no. 1, Jan. 1958, p. 94-106.

Chemical conversions during mechanical destruction of polymers. Effects of the styrene content in rubber mixture and of the temperature of mastication on the rate of polymerization. Effects of certain additions on the stability of polystyrene-rubber sheets.

10190* (Russian.) Change in Infrared-Absorption Spectra During Vulcanization of Ebonites. **Izmenenie infrakrasnykh spektrov pogloshcheniia pri vulkanizatsii ebonitov.** A. S. Kuz'minskii and L. V. Borkova. *Zhurnal Prikladnoĭ Khimii*, v. 31, no. 4, Apr. 1958, p. 648-652.

See also: **10113** (compounding of PVC).

SPACE HEATING AND CONDITIONING

10191* Applying Mixed-Flow Units in Commercial Air-Moving Systems. Anwar A. Atalla. *Air Conditioning, Heating, and Ventilating*, v. 55, Apr. 1958, p. 64-67.

Principle of mixed-flow as applied to air-moving systems; data on selection of units; comparison of direct and belt driven blowers.

10192* High Velocity Dual Duct Systems for Multi-Zone Installations. I. N. S. Shataloff. *Air Conditioning, Heating, and Ventilating*, v. 55, Apr. 1958, p. 76-85.

Design considerations.

10193 Open Cycle Refrigeration. The Bootstrap Refrigerator. E. J. Gabbay. *Aircraft Engineering*, v. 30, Mar. 1958, p. 64-71.

Basic theory of the unit which is an open cycle system resembling a turbo-jet engine in its mode of working, but the over-all heat energy changes occur in a reversed sense. Design and performance of system potentially suitable for cooling needs in the immediate range of supersonic flight.

10194* Harnessing the Sun for Heating: Test House Uses Warm-Air System. *Heating & Air Conditioning Contractor*, v. 49, no. 7, Apr. 1958, p. 49-53.

Perimeter warm-air heating system uses sun's rays as heat source, provides summer cooling and year-round domestic hot water.

10195 Activated Charcoal for Air Purification. H. L. Barnebey. *Heating, Piping & Air Conditioning*, v. 30, Mar. 1958, p. 153-160.

Methods are presented for determining the load of contaminants to be removed and for the selection and sizing of suitable equipment. The quantity of activated charcoal required can be predicted directly from odor removal requirements.

10196 Cooling Towers, Cold Water Piping Serve Process Cooling Applications. James C. Bishop. *Heating, Piping & Air Conditioning*, v. 30, Apr. 1958, p. 99-103.

How to design a typical system; determining water requirements; design for anticipated expansion; use of tower basin as settling tank; piping design considerations; control to meet weather changes.

10197 Pulsations in Residential Gas Furnaces With Multiple-Port Burners. A. A. Putnam. *Heating, Piping & Air Conditioning*, v. 30, Apr. 1958, p. 143-149.

A logical basic mechanism of combustion-driven oscillations in furnaces equipped with multiple-port, slot, or ribbon burners is described. One factor involved is the time lag, and the manner in which it is affected by burner-port design, fuel, mixture ratio, and mixture flow rate. A second factor concerns the relative magnitude of driving and damping terms involved in determining the stable amplitude of oscillations.

10198 Thermal Insulation Materials. Robert J. Fabian. *Materials in Design Engineering*, v. 47, Mar. 1958, p. 119-138.

Properties and uses of major types.

10199* Refrigeration Controls. III. Pressure-Operated Types. H. H. Egginton. *Modern Refrigeration*, v. 61, Mar. 1958, p. 239-242.

Technology of constant pressure expansion valves.

10200 How to Calculate Thermal Radiation From Hot Surfaces. Gordon V. Thompson. *Product Engineering*, v. 29, no. 13, Mar. 31, 1958, p. 116-117.

Chart helps pick best surface finishes and temperature levels for dissipating heat to atmosphere.

10201* How to Make the Most Effective Use of Psychrometric Charts. M. A. Ramsey. *Refrigerating Engineering*, v. 66, Apr. 1958, p. 31 + 4 pages.

As guides to the specification of air conditioning and refrigeration equipment, psychrometric charts provide rapid reference to humidity and temperature inter-relationships and speed the accurate determination of the merits of preliminary work, alternate possibilities, and final recommendations.

10202* Automatic Control and Instrumentation Applied to Air Conditioning. D. H. Powell. *Society of Instrument Technology, Transactions*, v. 10, no. 1, Mar. 1958, p. 31-43.

The application of automatic temperature controls and instruments for both "comfort" and "process" conditioning plants, with particular reference to the controllability of different types of plant components.

10203 (Czech.) Automatic Control of Compressor - Type Freezer Installations. **Samočinná řízení kompresorových chladicích zařízení.** K. Segenschmid and B. Kudrna. *Strojírenství*, v. 8, no. 3, Mar. 1958, p. 163-167.

System automatically regulates normal operations and provides for failure in any part of the installation. Schemes for various positions of the relay are given.

10204 (Czech.) Determination of Air Quantity in Natural Ventilation. **Měření množství vzduchu při přirozeném větrání.** K. Maurer. *Strojírenství*, v. 8, no. 3, Mar. 1958, p. 220-223.

Methods for determining the quantity of exchanged air in natural systems, especially in aerating installations. A new method based on the heat balance of hall to be ventilated is especially suitable for hot shops.

10205* Heat Pump and Heating Cables Installed in the Same Residence: First Year of Comparative Operation. C. W. Jones and E. E. Linden. *Applications and Industry*, 1958, no. 35, Mar., p. 43-48.

Costs, performance, heat loss calculations, and equipment.

10206 General Aspects of Cooling Airborne Electronic Equipment. J. Kaye and H. Y. Choi. *IRE Transactions on Aeronautical and Navigational Electronics*, v. ANE-5, no. 1, Mar. 1958, p. 4-9. (TK1 In6.6a Vis.)

Thermal characteristics associated with high-speed flight of manned and unmanned vehicles are related to the thermal problems of irreversible electrical and magnetic components which possess upper bounds of temperature for reliable operation. Various types of cooling devices, fluid flow processes, and techniques are discussed.

10207 Performance of an Air Reservoir Heat Pump in Air Conditioning a Nine Room Residence in Lexington, Kentucky. Merl Baker. *Kentucky. University. College of Engineering. Engineering Experiment Station Bulletin No.* 42, Dec. 1956, 16 pp. (TA21 K41.82b Vis.)

Advantage of utilizing the same machine for both heating and cooling compensates somewhat for low efficiency during winter months.

10208* Design-Engineering a New Line of Large Hermetic Reciprocating Compressors. Hugh R. Goodfellow and Karl M. Gerteis. *Refrigerating Engineering*, v. 66, May 1958, p. 44 + 6 pages.

Review of development work leading to a 10-60-ton line of hermetic compressor and condenser units.

10209 Performance of Small-Pipe Warm-Air Perimeter Heating Systems. Donald R. Bahnfleth, Chuan F. Chen, and Herbert T. Gilkey. *University of Illinois, Engineering Experiment Station Bulletin No.* 445, 1957, 35 pp. (T1 I6b Vis.)

Data from investigations of systems having warm-air registers located at the perimeter of the residence and utilizing 4-in. diam. ducts.

See also: **9193** (Isceon refrigerant); **9611** (duct design for power plants).

TEXTILES, FIBERS, LEATHER, AND PAPER

10210* The Dyeing of Filament Nylon With Acid Dyes. J. A. Bittles, J. A. Brooks, J. J. Iannarone, Jr., and H. P. Landerl. *American Dyestuff Reporter*, v. 47, no. 6, Mar. 24, 1958, p. P183 + 4 pages.

Solvent-assisted, cationic agent-assisted, anionic agent-assisted, and high-temperature dyeing methods are discussed.

10211* The Causes of Natural Durability in Timber. I. The Role of Toxic Extractives in the Resistance of Tallowwood (*Eucalyptus microcorys* F. Muell.) to Decay. E. W. B. DaCosta and P. Rudman. *Australian Journal of Biological Sciences*, v. 2, no. 1, Feb. 1958, p. 45-57 + 1 plate.

The high resistance of tallowwood to decay is due almost entirely to the presence of a toxic methanol-soluble material.

10212 Brushmaking Materials. F. Kidd. 188 pp. 1957. Partridge Printers Leeds, Ltd., Great Britain. (TS2301.B8 K53b)

A book concerned with brush filling materials of animal, vegetable, and man-made origin and their physical and chemical properties.

10213* (German.) Research on the Non-Basic Sulfite Pulping of Woods. **Untersuchungen über den basenlosen Sulfitaufschluss von Hölzern.** Paul Schorning. *Faserforschung und Textiltechnik*, v. 8, no. 12, Dec. 1957, p. 487-494.

Additions of water-soluble organic solvents to an aqueous SO_2-solution may result in rapid pulping of leaf and coniferous woods above 100 C.

10214* Synthetic Resins in Textile Manufacture. II. A. J. Hall. *Fibres*, v. 19, Mar. 1958, p. 85 + 2 pages.

Synthetic resins are used for permanent flameproofing, protection against micro-biological attack, special printing techniques, and improvements in abrasion resistance.

10215* Review of Chemical Utilization. Irwin A. Pearl. *Forest Products Journal*, v. 8, Feb. 1958, p. 38-44.

Recent developments in lignin chemistry make up a large part of this report. Also discussed is research in the fields of naval stores, utilization of bark, chemical pulping, and utilization of lignin.

10216* Developments in Glues and Gluing—1957. R. F. Blomquist. *Forest Products Journal*, v. 8, Feb. 1958, p. 45-51.

Trends in types of adhesives used for various applications are discussed. Gluing techniques and equipment advancements are described in relation to plywood, laminating treated and untreated wood, assembly and special composite gluing, H.F. gluing, and edge and end gluing. Improvements in methods of testing are also discussed.

10217* Upgrading Spent Sulphite Liquor by Sugar Removal. Philip Luner, G. A. Dubey, L. A. Boggs, and A. J. Wiley. *Forest Products Journal*, v. 8, Feb. 1958, p. 82-86.

Existing methods for sugar removal are examined and their relative efficiencies are discussed analytically. A novel process involving reactive solvent extraction is outlined, and two aspects of lignin characterization are presented. Preliminary results indicate that the chemical activity of various products is closely related to their lignin content.

10218* (Russian.) Intensification of Tanning in Solution Dispersed by Ultra Sound. **Intensifikatsiia dubleniia ul'trazvukovym dispergirovaniem rastvorov.** V. M. Fridman and A. N. Mikhailov. *Legkaia Promyshlennost'*, v. 18, no. 3, Mar. 1958, p. 13-14.

10219* Keeping Up With the New Polyethylene Films. LeRoy H. Doar, Jr. *Paper, Film and Foil Converter*, v. 32, Apr. 1958, p. 36 + 3 pages.

Effect of density on properties; effect of property changes on paper converting operations.

10220* A Survey of Modern Methods of Wood Pulp Manufacture. Raymond L. Janes. *Paper Trade Journal*, v. 142, Feb. 24, 1958, p. 44-51.

10220a* Storage of Chips in Outside Piles. J. S. Hensel. *Paper Trade Journal*, v. 142, Mar. 24, 1958, p. 40-42.

Method for minimizing deterioration.

10221* Wear of Fourdrinier Wire Bearing Materials. I. T. Pye. *Pulp and Paper Magazine of Canada*, v. 59, Mar. 1958, p. 124-139.

A brief survey is made of possible wear mechanisms. To establish the properties required for a good bearing surface a number of materials were tested under simulated paper machine conditions.

10222* Future Trends in the Manufacture and Use of Printing Paper. D. R. Simonds, R. P. Tyler, A. Beecroft, H. Williamson, and S. J. Leishman. *Pulp and Paper Magazine of Canada* (Convention Issue), v. 59, 1958, p. 164-171.

A compilation and discussion of papers presented at the Annual Meeting of the Technical Section, Canadian Pulp and Paper Association, held in Montreal, Que., January 29, 30, 31, 1958.

10223* Leather Manufacture and Instrumentation. F. E. Humphreys. *Society of Instrument Technology, Transactions*, v. 10, no. 1, Mar. 1958, p. 1-12.

10224* (Swedish.) Clarifying the White Liquor With Hydrocyclones. **Efterklarning av vitlut med hydrocykloner.** E. Ehrnrooth. *Svensk Papperstidning*, v. 61, no. 4, Feb. 28, 1958, p. 91-95.

Theoretical aspects of hydrocyclones. Separation characteristics as a function of overflow. Chemical analysis and particle size distribution of the separated material and of the remaining solids in the purified white liquor.

10225* (Swedish.) Effect of Some Processing Factors on the Properties of Hardboard. **Inverkan av några tillverknings-**

tekniska faktorer på hårda träfiberskivors egenskaper. K. E. Carlsson. *Svensk Papperstidning*, v. 61, no. 5, Mar. 15, 1958, p. 128-132.

Effects of variations in the processing, degree of beating, alum addition, dry content before hot pressing, time-temperature schedule during pressing.

10226* Effect of Fluid Properties on Condensate Behavior. Robert E. White and Thomas W. Higgins. *Tappi*, v. 41, Feb. 1958, p. 71-76.

In this investigation of paper driers, the effects of fluid viscosity, surface tension and density, interfacial conditions, and quantity of fluid on the critical speeds were studied. The viscosity and density of the fluid were found to be major factors.

10227* An Interpretation of the Beating Process of Paper Based on the Hydrogen-Bond Theory of the Mechanical Properties of Cellulose Sheets. Alfred H. Nissan. *Tappi*, v. 41, Mar. 1958, p. 131-134.

Accepting the Morse function as a reasonable approximation of the hydrogen-bond energy as a function of bond length, the author analyzes the stress-strain curves of such materials in terms of molecular and thermodynamic parameters.

10228 Paper Loading Materials. W. R. Willets, et al. *TAPPI Monograph Series No.* 19, 1958, 132 pp. (TS1080 T22tm Vis.)

A monograph on the requisites and desirable qualities of paper fillers such as $BaSO_4$, $CaSO_4$, Ti pigments, and $CaCO_3$.

10229* How 8 Fibers Compare in Stress-Strain Properties. J. F. de Bordenave, D. J. Bringardner, and H. T. Pratt. *Textile World*, v. 108, no. 3, Mar. 1958, p. 97-98.

10230* (German.) Degradation of Alkalized Cellulose With Molecular Oxygen. **Über den Abbau von alkalisierter Cellulose mit molekularem Sauerstoff.** Hermann G. Müller. *Textil-Rundschau*, v. 13, no. 2, Feb. 1958, p. 67-81.

Analyzes the effect of molecular O on alkalized cellulose from the viewpoint of alkali- and water absorption by cellulose.

10231 Bark-Peeling Machines and Methods. E. W. Fobes. *U. S. Forest Products Laboratory Report No.* 1730, Feb. 1957, 48 pp. (TS800 Un3.3r Vis.)

Results of a survey serving as a guide in selecting machines for specific needs. Provides basic data on various designs, operational characteristics, and other important aspects of devices now in use or under test.

10232* What an Ultraviolet Reflectance Curve Can Tell About a Textile Material. I. Fiber Identification. George Thomson, Charles A. Lermond, and Ruth A. Kenney. *American Dyestuff Reporter*, v. 47, no. 8, Apr. 21, 1958, p. P267-P272.

The ultraviolet reflectance characteristics of twenty different fibers were determined. They are sufficiently different to serve not only as an aid in identification but also to determine the type of bleach used, presence or absence of a delustrant, effect of chemical treatment and finishes, and the effect of heat and light.

10233* Prevention of Wool Fabric Shrinkage With Polyamide-Epoxide Resin Finishes. C. E. Pardo and R. A. O'Connell. *American Dyestuff Reporter*, v. 47, no. 10, May 19, 1958, p. P333-P338.

Excellent shrinkage protection is obtained with aqueous resin dispersions containing from 30 to 70 parts by weight of either the polyamide or epoxide resin component at uptake levels of 3.5 to 4%.

10234* Tanning Studies With Dialdehyde Starch. E. M. Filachione, et al. *American Leather Chemists Association, Journal*, v. 53, Feb. 1958, p. 77-89.

Dialdehyde starch, a reactive derivative potentially, available at low cost by oxidation of starch, has been shown to have tanning action. Studies were made to determine the effect of such factors as degree of oxidation, method of solubilization, time of treatment, and pH of medium on the rates and degree of tannage.

10235 The Geometry of Twisted Multi-Filament Structures. G. J. Stansfield. *British Journal of Applied Physics*, v. 9, Apr. 1958, p. 133-139.

A self-consistent geometry of cords made from multi-filament yarns is derived from the assumption that all filaments in a cord follow an epihelical path. Formulas for changes in ply length, ply twist, and cord length on cording are derived which enable the retraction of cords and yarns on twisting to be predicted accurately.

10236* An Approach to the Study of Vegetable Tannins by the Oxidation of Plant Phenolics. D. E. Hathway. *Society of Leather Trades' Chemists, Journal*, v. 42, Apr. 1958, p. 108-121.

This work is concerned with such chemical reactions as might be involved in the formation of large aromatic molecules found in plant tissues, and especially those found in tanning extracts. These are of two classes, the one based on gallic acid or gallates and their oxidation products, and the other based on catechin-like substances and their polymerization products.

10237* Paper Drying Theory. Mauri Soininen. *Paper Trade Journal*, v. 142, May 12, 1958, p. 36-40.

Presents no new theory but expresses the happenings and phenomena upon which a drying theory should be based.

10238* Natural Variation in Wood Specific Gravity of Loblolly Pine, and an Analysis of Contributing Factors. Bruce J. Zobel and Robert L. McElwee. *Tappi*, v. 41, Apr. 1958, p. 158-161.

Knowledge of the presence and inferior qualities of juvenile wood make it necessary to take a more critical look at the value of young thinnings, tops from logging operations, veneer cores. and lowered rotation ages from a fiber yield standpoint.

10239* Diploid Versus Triploid Aspens as Pulpwood Sources With Reference to Growth, Chemical, Physical, and Pulping Differences. J. P. Van Buijtenen, P. N. Joranson, and D. W. Einsphar. *Tappi*, v. 41, Apr. 1958, p. 170-175.

The tear factor was significantly higher in triploids, evidently being related to the greater length of triploid fibers. Tests of most other hand sheet properties generally favored triploids, but with large within-group variance, the differences not being significant.

10240* Variation in the Specific Gravity of Slash Pinewood and Its Genetic and Silvicultural Implications. Thomas O. Perry and Wang Chi Wu. *Tappi*, v. 41, Apr. 1958, p. 178-180.

An alignment chart for determining the relationship between volume, specific gravity, and dry pulp yield is presented. The possibilities of controlling specific gravity characteristics of slash pinewood through environmental and genetic manipulation are reviewed in the discussion.

10241* The Amino Acid Composition of Keratins. V. A Comparison of the Chemical Composition of Merino Wools of Differing Crimp With That of Other Animal Fibers. D. H. Simmonds. *Textile Research Journal*, v. 28, Apr. 1958, p. 314-317.

Two Merino wool samples have been compared with single samples of human hair and kid mohair to determine whether their composition could be related to their chemical and physical properties.

See also: **9308** (oil and water repellents for cotton); **9417** (new resins for white cottons); **9443** (applications of synthetic and wood felts); **9701** (mild steel corrosion in pulping liquors); **10100** (new acrilan dyeing technique).

WELDING AND JOINING

10242 Bonding Magnesium. Chance Vought Developments for Airframe and Missile Applications. B. A. Forcht. *Aircraft Production*, v. 20, Apr. 1958, p. 134-140.

Chemical cleaning, tensile shear strength, design, and cost considerations.

10243 Measurements on the Diffusible, Residual, and Total Hydrogen Contents of Weld Metal. P. D. Blake. *British Welding Journal*, v. 5, Mar. 1958, p. 126-129.

10244 Thermal Expansion as a Basis for Control of Spot Welding of Duralumin. Iu. A. Pachentsev. *Henry Brutcher Translation No.* 3978, 8 pp. (From *Avtomaticheskaia Svarka*, v. 9, no. 3, 1956, p. 65-71.) Henry Brutcher, Altadena, Calif.

Displacement of electrodes; correlation between electrode motion, nugget sizes, and spot weld strengths; welding of duralumin sheet controlled by contact transducer.

10245 Electric Arc and Resistance Welding. III. 284 pp. 1952. American Institute of Electrical Engineers, New York. (TK4660 C76e Vis.)

Papers and discussions from the 1952 Conference on Electric Welding.

10246 How to Braze Stainless Steels. II. H. M. Webber. *Industrial Heating*, v. 25, Mar. 1958, p. 503 + 6 pages.

Selecting the equipment. (To be continued.)

10247 How and Where to Use Shielding Gases for Welding. O. T. Barnett. *Iron Age*, v. 181, no. 15, Apr. 10, 1958, p. 91-98.

10248* (Russian.) Basic Parameters of Seam-Butt Resistance Welding of Thin Sheets. **Osnovnye parametry protsessa shovno-stykovoi kontaktnoi elektrosvarki tonkikh listov.** R. B. Rudzit. *Latvijas PSR Zinātnu Akademijas Vestis*, 1958, no. 1, p. 125-135.

Mechanical parameters of the process. Electrical resistance and the shapes of the current field and the temperature field in the welding zone are discussed.

10249 Some Metallurgical Aspects of Welding Higher Strength Steels. D. Birchon. *Machinery Lloyd (Overseas Ed.)*, v. 30, no. 7, Mar. 29, 1958, p. 71-73.

Use of transformation characteristics in welding.

10250* Welding Copper-Base Alloy Tubes. J. F. Sebald and L. H. Hawthorne. *Power*, v. 102, Apr. 1958, p. 92 + 8 pages.

Effect of consecutive and skip welding sequence. Mechanical strength of tube-to-tube-sheet joints.

10251 Which Adhesive for What. R. W. James and R. W. Gormly. *Product Engineering*, v. 29, no. 11, Mar. 17, 1958, p. 79-81.

Some tips on selection of the proper structural adhesive.

10252* (German.) The Efficiency of Current Supply Systems for Electric-Arc Welding. **Der Wirkungsgrad von Stromquellen für die Lichtbogenschweissung.** E. Bergmann. *Schweissen und Schneiden*, v. 10, no. 3, Mar. 1958, p. 77-79.

Efficiency; duty ratio; suitable application; comparative survey of welding transformer, motor-generator, rectifier, and multi-operator equipment.

10253* (German.) Welding of Titanium. **Schweissen von Titan.** Klaus Rüdinger. *Schweissen und Schneiden*, v. 10, no. 3, Mar. 1958, p. 79-86.

Influence of gases on Ti. Protection of the weld, effect of the purity of the protective gas, its velocity, the welding current, and filler material upon weld quality. Strength properties. Bending fatigue strength of Ti and its welds; heat treatment and ductility.

10254* (German.) Tungsten-Inert-Arc Welding of Spheroidal Graphitic Cast Iron. **Wolfram-Inertschweissen von Gusseisen mit Kugelgraphit.** Jürgen Ruge and Werner Zitzelsberger. *Schweissen und Schneiden*, v. 10, no. 3, Mar. 1958, p. 86-90.

Experimental conditions and procedure. Influence of heat treatment and welding conditions.

10255* (German.) The Potential Effect of the Mechanical Vibration of Electrodes on Arc Welding. **Über die mögliche Beeinflussung des Lichtbogenschweissvorganges durch mechanisches Vibrieren der Elektrode.** G. Tybus. *Schweisstechnik* (Berlin), v. 8, Mar. 1958, p. 101-105.

10256* (German.) Welding of Tungsten in Argon Protective Atmosphere. **Schweissen von Wolfram unter Argonschutz.** W. Gilde and A. Labus. *Schweisstechnik* (Berlin), v. 8, Apr. 1958, p. 130-132.

Welding tests aimed at joining W wire with W, Mo, Ni, Fe, Pt, Al, Co, iron alloys, and Pt alloys.

10257 The Society of Naval Architects of Japan, 60th Anniversary Series. v. I. Researches on Weldable High Strength Steels. Hiroshi Kihara, Haruyoshi Suzuki, and Hiroshi Tamura. 247 pp. 1957. Society of Naval Architects of Japan, Tokyo. (VM147 K55r)

A review of recent Japanese research, with special emphasis on notch toughness, weld hardening, weld ductility, weld cracking, coated electrodes, submerged arc welding, and effect of O cutting.

10258* (Russian.) Electrodes for Welding Heat-Resistant Chromium Steel. **Elektrody dlia svarki teploustoichivoi khromistoi stali.** V. V. Bazhenov and T. R. Fediaeva. *Svarochnoe Proizvodstvo*, 1958, no. 3, p. 26-29.

Study of 12% Cr steel. Relationship between notch impact strength of the metal seam (after annealing at 700-720 C) and the content of W, Mo, V, Nb, and Ni.

10259* (Russian.) The Effect of Certain Alloying Elements on the Properties of Welded Seams of Titanium and Its Alloys. **Vliianie nekotorykh legiruiushchikh elementov na svoistva svarnykh soedinenii titana i ego splavov.** M. Kh. Shorshorov and G. V. Nazarov. *Svarochnoe Proizvodstvo*, 1958, no. 3, p. 30-33.

Shows how the rate of cooling (within the B $\beta \rightarrow \alpha$ conversion) in Ti welding affects the mechanical properties of the weld zone adjacent to the seam.

10260 Titanium Welding Techniques. *Titanium Metals Corporation of America. Titanium Engineering Bulletin No.* 6, 31 pp. (TN799.T5 T53t Conitn.)

Fusion and resistance welding equipment and procedures. Typical Ti weldments. Evaluation of weld quality.

10261* Attaching Carbide Tips to Steel Bodies. Frank E. Montie. *Tooling & Production*, v. 24, no. 1, Apr. 1958, p. 83-86.

Methods of attching carbide tips to steel bodies including brazing, soldering, adhesives, mechanical holding, and fusion.

10262 Whys and Hows of Stress Relieving. Gerald Scott. *Welding Engineer*, v. 43, Apr. 1958, p. 47-50.

10262a Tungsten-Arc Welding of 0.002-In. and 0.005-In. Stainless Steel and Titanium. Jay C. Collins and S. P. Jenkins. *Welding Journal*, v. 37, Apr. 1958, p. 342-347.

10263 New Forge Welding of Aluminum and Magnesium Alloys. L. A. Cook and D. G. Shafer. *Welding Journal*, v. 37, Apr. 1958, p. 348-358.

Forge welding consists of heating the parts to be welded to a temperature high enough to allow good uniform flow of the materials without cracking and yet sufficiently low that the samples are not overaged or partially annealed in the process.

10264 Spot Welding of Ti-6Al-4V Alloy. R. K. Nolen, J. F. Rudy, H. Schwartzbart, and H. D. Kessler. *Welding Journal*, v. 37, Apr. 1958, p. 129s-137s.

Systematic variation of machine settings and weld parameters was employed to develop a satisfactory welding procedure.

10265 Effects of Steel-Making Practice on Submerged-Arc Weld Porosity. James T. Lapsley, Jr. *Welding Journal*, v. 37, Apr. 1958, p. 169s-178s.

Weld-porosity susceptibility was investigated for ten heats of nominally-similar low-carbon steel representing four open-hearth deoxidations; Al-Si and Si semikilled, and Al- and mechanically-capped practices. Processing variable effects of teeming sequence, ingot slab position, and as-rolled sheet position were also included.

10266 Dynamic Measurement of Stress Associated With Weld Cracking. S. S. White, W. G. Moffatt, and C. M. Adams, Jr. *Welding Journal*, v. 37, Apr. 1958, p. 185s-192s.

Techniques and specimen geometries have been developed which permit measurement during and after welding through interpretive use of conventional strain gages.

10267 Selenium Rectifiers for Electric Welding. L. H. Morgan and J. E. Fawkes. *Welding and Metal Fabrication*, v. 26, Apr. 1958, p. 126-133.

Construction, equipment, advantages, and applications.

10268* (Czech.) Welding of High-Purity Aluminum in the Production of Equipment for the Chemical Industry. **Svařování hliníku vysoké čistoty při výrobě zařízení určených pro chemický průmysl.** Jaroslav Švejda. *Zváranie*, v. 7, no. 2, Feb. 1958, p. 49-53.

Effect of welding techniques, material preparation, purity of shielding gas (argon) and quality of W electrode on the quality of joints in 99.85% Al, especially in equipment for production of HNO_3.

10269* (Czech.) Problems in Automatic Submerged Welding of Low Alloy Steels. **Problematika automatického zvárania nízkolegovaných ocelí pod tavidlom.** Julius Zeke. *Zváranie*, v. 7, no. 2, Feb. 1958, p. 54-56.

Comparison of the applicability of individual welding methods and materials. Results of chemical analysis and mechanical tests on the joints.

10270* (Czech.) Cold Welding of Gray Cast Iron. **K svařování šedé litiny za studena.** Rudolf Krňák. *Zváranie*, v. 7, no. 3, Mar. 1958, p. 69-73.

Experiences gained in cold press welding gray cast iron in usual working conditions and some proposals for improving technology and increasing efficiency.

10271* (Czech.) Multi-Cell Panels for Asynchronous Time Control of Spot-Welders. **Stavebnicové časové panely pro nesynchronní řízení bodových svářeček.** Karel Jarský. *Zváranie*, v. 7, no. 3, Mar. 1958, p. 79-83.

Brief information on improvements in automation of older types of spot-welders, and their successful modernization using adjustable multi-cell panels. Circuit diagrams of control panels for various working cycles.

10272* (Russian.) Carbon Dioxide Shielded Arc Welding of Heat Resistant "20 KhMF" Steel. **Svarka v srede uglekislogo gaza teploustoichivoi stali 20 KhMF.** B. S. Kasatkin and Iu. N. Vakhnin. *Avtomaticheskaia Svarka*, v. 11, no. 3, Mar. 1958, p. 3-11.

10273* (Russian.) Impact Strength Characteristics of Welded Joints at Low Temperatures. **O vliianii nizkikh temperatur na prochnost' svarnykh soedinenii pri udarnom rastiazhenii.** Iu. P. Sataev. *Avtomaticheskaia Svarka*, v. 11, no. 3, Mar. 1958, p. 57-61.

10274* **Some Aspects of Stainless Steel Welding.** O. Kobel and L. J. Taylor. *Canadian Metalworking*, v. 21, Apr. 1958, p. 70 + 3 pages.

Effects of heat on the steel; carbide precipitation; constitution diagram for stainless steel weld metal; thermal conductivity; welding heavy sections; atomic power developments.

10275* **5 New Brazing Alloys for High-Temperature Service.** A. M. Setapen. *Industry & Welding*, v. 31, May 1958, p. 51 + 3 pages.

Composition, melting point, and flow temperature of Ag-Cu-Li, Ag-Pd, Mn-Ni, Ni-Cr-Si-B, and Au-Cr-Ni alloys.

10276 Ultrasonic Welding—A New Technique Grows. J. Byron Jones. *Metal Progress*, v. 73, no. 4, Apr. 1958, p. 68-72.

Reviews basic principles and present capabilities of the ultrasonic welding process, particularly in the joining of high-temperature and corrosion resistant materials.

10277* **Nuclear Power Welding Symposium.** *Nuclear Power*, v. 3, May 1958, p. 206-229.

Symposium includes eight papers on subjects such as pressure vessel fabrication, heat exchanger design, utilization of Al and Mg, welding of U, Be, Zr, and Nb, use of steels, and nondestructive testing and inspection.

10278* (Russian.) A New Method for Unilateral Automatic Seam Welding on a Moving Red-Copper Base. **Novyi sposob odnostoronnei avtomaticheskoi svarki shvov na skol'ziashchei krasnomednoi podkladke.** V. Ia. Dubovitskii. *Promyshlennaia Energetika*, v. 13, no. 4, Apr. 1958, p. 19-20.

10279* (French.) Cracking Due to Welding in the Transformation Zone of Alloy Steel Hardened in the Atmosphere. **Fissuration due au soudage dans la zone de transformation des aciers alliés trempants à l'air.** H. Sekiguchi and T. Kobayashi. *Revue de la Soudure*, v. 14, no. 1, 1958, p. 51-58.

Importance of H relative to cracks under a bead. Cracks under the joint and transversal and longitudinal cracks were examined; time of initial cracking after welding was determined with respect to the martensitic transformation.

10280* (Russian.) Mechanization and the Automatic Control of Welding Processes. **Mekhanizatsiia i avtomatizatsiia svarochnykh protsessov.** V. V. Boitsov, V. A. Kostiuk, and B. D. Orlov. *Svarochnoe Proizvodstvo*, 1958, no. 4, Apr., p. 1-5.

Reviews welding mechanization in the aircraft industry.

10281* (German and French.) Measuring the "Wetting Temperatures" in Brazing and Relationships With the Other Hard Soldering Temperature Concepts. **Messungen der "Benetzungstemperaturen" beim Lotschweissen und deren Zusammenhänge mit andern Löttemperaturbegriffen.** J. Colbus. *Zeitschrift für Schweisstechnik*, v. 48, no. 1, Jan. 1958, p. 10-15; no. 2, Feb. 1958, p. 36-45.

Effects of thermal conductivity of the basic materials on the lower limit of the wetting temperature. Effects of temperature on the speed of welding.

10282* (Czech.) Gases in Welding Metals. **Plyny ve svarovém kovu.** Miroslav Šícha. *Zváranie*, v. 6, no. 12, Dec. 1957, p. 358-363.

Short survey on the present state of the gas problem especially on the presence of gases in welding metals, compiled from the present literature and from other studies.

10283* (Czech.) Automatic Submerged Arc Welding of Low Alloy Steels. **Problematika automatického zvárania nízkolegovaných ocelí pod tavidlom.** Julius Zeke. *Zváranie*, v. 7, no. 1, Jan. 1958, p. 2-8.

Development of automatic welding methods for series 15 low alloy steels. Comparison of methods; advantages and applicability. Chemical analysis of fluxes, weld, and base metals.

10284* (Czech.) Weldability of 3% Ni-Cr-Mo Steels With Higher Carbon Contents. **Svařitelnost ocelí 3% NiCrMo s vyšším obsahem uhlíku.** Václav Pilous. *Zváranie*, v. 7, no. 1, Jan. 1958, p. 8-15.

Procedures for testing alloy steels of a given composition to determine their weldability and to develop a suitable welding technology. Method of welding, determination of preheating temperature, post-welding heat treatment, and mechanical properties of welded joints.

See also: **9151** (glass-to-metal seals); **9442** (oscillations in d.c. carbon arc); **9641** (percussion welding of thermocouples); **9787** (brittle fracture and burst in flash-welded line pipe); **9857** (phase analysis of resistance-welded steel joints); **9896** (inspection of welded tubes); **10091** (spin-welding of plastics).

MISCELLANEOUS

10285 (English.) **Discussion and Solution of the Cubic Equation. A New Method for Use in Practical Calculations.** Bent Christensen. *Acta Polytechnica (Applied Mathematics and Computing Machinery Series)*, v. 1, no. 4, 1957, 20 pp. (T1 Ac81 Vis.)

Solution of the ordinary cubic equation through solution of a reduced equation containing only one parameter which indicates the nature of the roots.

10286* **Inequalities of Critical Point Theory.** Everett Pitcher. *American Mathematical Society, Bulletin*, v. 64, Jan. 1958, p. 1-30.

Gives an account of a specific problem in critical point theory, namely the problem of a smooth function on a Riemannian manifold.

10287 Anaconda. Isaac F. Marcosson. 370 pp. 1057. Dodd, Mead & Co., New York. (HD9539.C72 M33a)

A history of the Anaconda Company, the largest nonferrous mining and metal fabricating organization in the world.

10288 The Analysis of Multiple Time-Series. M. H. Quenouille. 105 pp. 1957. Hafner Publishing Co., New York. (QA276 Q34an)

10289* (German.) Extent of Protection of Chemical Patents as Seen With the Eyes of the Infringement Judge. **Schutzumfang chemischer Patente aus der Sicht des Verletzungsrichters.** H. Winkler. *Angewandte Chemie*, v. 70, no. 5, Mar. 7, 1958, p. 117-123.

10290* (German.) Interpretation of the Extent of Protection of Chemical Patents and Predetermination of the Extent of Protection as Part of the Granting Procedure. **Auslegung des Schutzumfanges chemischer Patente und Vorausbestimmungen des Schutzumfanges im Rahmen des Erteilungsverfahrens.** H. Dersin. *Angewandte Chemie*, v. 70, no. 5, Mar. 7, 1958, p. 123-128.

10291* (German.) Extent of Protection of Chemical Patents as Seen With the Eyes of the Inventor. **Der Schutzumfang chemischer Patente aus der Sicht des Erfinders.** L. Rheinfelder. *Angewandte Chemie*, v. 70, no. 5, Mar. 7, 1958, p. 128-133.

10292 Trends and Outlook for Technological Progress From the Standpoint of the Research Scientist. B. D. Thomas. *ASTM Bulletin*, 1958, no. 228, Feb., p. 70.

The military and economic strength of the U. S. will depend primarily on actions of the Federal Government that encourage scientific and technological progress and industrial enterprise. There is a pressing need for more public appreciation of the role of science and technology in our economy. This must be built up through education and sympathetic support of all elements in our society.

10293 Runs Determined in a Sample by an Arbitrary Cut. Paul S. Olmstead. *Bell System Technical Journal*, v. 37, Jan. 1958, p. 55-82.

Discusses certain nonparametic measures for use in detecting the presence of assignable causes in experimental data.

10294 Contract Chemical Research in Europe. Frank C. Croxton and M. A. W. Barnick. *Chemical Engineering Progress*, v. 54, Jan. 1958, p. 59-63.

Contract research by independent research organizations has rapidly developed in Europe since its introduction there in 1947. Research facilities in 17 countries are described. Rapid expansion in the future is anticipated.

10295 Circles. D. Pedoe. 78 p. 1957. Pergamon Press, New York. (QA484 P34c)

Properties of circles. Representation of a circle by means of a point in ordinary space. The Poincaré model of hyperbolic non-Euclidean geometry. The isoperimetric property of a circle.

10296 A Course in Multivariate Analysis. M. G. Kendall, editor. 185 pp. 1957. Hafner Publishing Co., New York. (QA276 K33c)

Component analysis; factor analysis; functional relationship; canonical analysis; some problems of sampling; history of multivariate analysis; tests on homogeneity; discriminatory analysis.

10297* Safety Award Handling of Atomic Materials. *Flow*, v. 13, no. 7, Apr. 1958, p. 82 + 5 pages.

10298* A Guide to Graduate Study. Programs Leading to the Ph.D. Degree. Frederic W. Ness, editor. 335 pp. 1957. Association of American Colleges, Washington, D. C. (LB2371 As78g Ref.)

Description of the programs leading to the Ph.D. degree offered by 135 colleges and universities in the U. S. Includes qualifications, requirements, and fees.

10299 (German.) Here Only Prayer Helps. **Da Hilft nur Beten.** Adalbert Bärwolf. 232 pp. 1956. L. Muth, Dusseldorf, Germany. (QC773 B28h)

Describes the Odyssey of 6000 German rocket scientists deported to USSR for work.

10300 An Introduction to Algebraic Topology. Andrew H. Wallace. 198 pp. 1957. Pergamon Press, New York. (QA611 W15i)

Topological spaces and topological properties of spaces; the fundamental group; the homology groups; continuous mappings and the homology groups; barycentric subdivision and excision; the homology sequence; simplicial complexes.

10301* Verbal and Motor Responses to Seven Symbolic Visual Codes. A Study in S-R Compatibility. Earl A. Alluisi and Paul F. Muller, Jr. *Journal of Experimental Psychology*, v. 55, no. 3, Mar. 1958, p. 247-254.

The information-handling performance of ten subjects was measured with conventional Arabic numerals and six other symbolic visual codes under both motor- and verbal response conditions.

10302* Linear Partial Differential Systems With an Additional Differential Equation at One Point. Avner Friedman. *Journal of Mathematics and Mechanics*, v. 7, Mar. 1958, p. 173-190.

Proof that all the solutions of a linear differential system of elliptic or parabolic type and of order m cannot satisfy an additional linear partial differential equation of order m at a fixed point.

10303* On the Numerical Solution of the Equations for Spherical Waves of Finite Amplitude. I-II. P. Fox, A. Ralston, and Leonard Roberts. *Journal of Mathematics and Physics*, v. 36, no. 4, Jan. 1958, p. 313-337.

10304 Screw Conveyors for Materials Handling. L. P. van Es. *Machinery Lloyd (Overseas Ed.)*, v. 30, Jan. 18, 1958, p. 71 + 5 pages.

General description of history, design, advantages, and use of horizontal, vertical, and inclined conveyors.

10305* A Symbolic Method for Finding Integrals of Linear Difference and Differential-Difference Equations. K. L. Cooke. *Mathematics Magazine*, v. 31, Jan.-Feb. 1958, p. 121-126.

10306 Mathematics and Wave Mechanics. R. H. Atkin. 348 pp. 1957. John Wiley & Sons, New York. (QC174.5 At51m)

Consists of introductory chapters on both pure and applied mathematics, followed by discussions of some of the more important applications of quantum theory.

10307 The Naval Architecture of Small Craft. D. Phillips-Birt. 351 pp. 1957. Philosophical Library, New York. (VM156 P54n)

A compendium of contemporary knowledge of naval architecture having practical application to craft of 120 ft. or less.

10308 Significance of the Redundant Solutions of the Low-Wick Equation. Richard Norton and Abraham Klein. *Physical Review*, v. 109, ser. 2, Feb. 1, 1958, p. 991-995.

The content of the Low-Wick scattering formalism is studied, using the example of a class of exactly soluble meson theories with fixed-source interaction. The theories in question describe a set of harmonic oscillators with an arbitrary distribution of frequencies, coupled to a scalar meson field by means of their total dipole moment.

10309* Research and Development. John S. Crout and Robert E. Greenlee. Paper from "Production Handbook". 2nd Ed. 31 pp. 1958. Ronald Press Co., New York. (TS155 C23p2 Ref.)

The various types of research are discussed along with an analysis of the function of research in industry. Both company-operated and independent research facilities are described. Gives procedures for the major phases of a research program including program initiation, manpower and equipment requirements, effective use of staff, organization, management control and surveillance, budgeting, and evaluation and control of results.

10310 Proceedings of Conferences on Land Surveying. Ken S. Curtis, editor. *Purdue University, Engineering Bulletin, Engineering Extension Dept., Extension Series No.* 93, Jan. 1958, 128 pp. (TA21 P97.2e Vis.)

Eleven papers presented during the period 1952-1957.

10311 Research on Fire. Horatio Bond, editor. 184 pp. 1957. National Fire Protection Assn., Boston. (TH9130 N21r)

A description of the facilities, personnel, and management of agencies engaged in research on fire.